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PANASONIC CT-20SX10B SERVICE MANUAL

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Service Manual

Color Television

Main Manual
(MJ4M)

Panasonic

Models	Chassis
CT-20SX10B	**AP354**
CT-20SX10CB	**AP354**
CT-24SX10B	**AP353**
CT-24SX10CB	**AP353**
CT-F2110XB	**XP353**
CT-F2510XB	**XP353**

This Service manual is issued as a service guide for the models of the **MJ4M** family listed above. Included in this manual are a set of schematic, block diagrams, functional descriptions, alignment procedures, disassembly procedures, and a complete parts list.

"**WARNING!** This Service Manual is designed for experienced repair technicians only and is not designed for use by the general public. It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product. **Products powered by electricity should be serviced or repaired only by experienced professional technicians.** Any attempt to service or repair the product or products dealt with in this Service Manual by anyone else could result in serious injury or death."

The service technician is required to read and follow the "**Safety Precautions**" and "**Important Safety Notice**" in this Main Manual.

Panasonic®

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Important Safety Notice

Special components are used in this television set which are important for safety. These parts are identified on the schematic diagram by the symbol ⚠ and printed in **BOLD TYPE** on the replacement part list. It is essential that these critical parts are replaced with the manufacturer's specified replacement part to prevent X-ray radiation, shock, fire or other hazards. Do not modify the original design without the manufacturer's permission.

Safety Precautions

General Guidelines

An **Isolation Transformer** should always be used during the servicing of a receiver whose chassis is not isolated from AC power line. Use a transformer of adequate power rating as this protects the technician from accidents resulting in personal injury from electrical shocks. It will also protect the Receiver from being damaged by accidental shorting that may occur during servicing.

When servicing, observe the original lead dress, especially in the high voltage circuit. Replace all damaged parts (also parts that show signs of overheating.)

Always Replace Protective Devices, such as fishpaper, isolation resistors and capacitors, and shields after servicing the Receiver. Use only manufacturer's recommended rating for fuses, circuits breakers, etc.

High potentials are present when this Receiver is operating. Operation of the Receiver without the rear cover introduces danger for electrical shock. Servicing should not be performed by anyone who is not thoroughly familiar with the necessary precautions when servicing high-voltage equipment.

Extreme care should be practiced when **Handling the Picture Tube**. Rough handling may cause it to implode due to atmospheric pressure. (14.7 lbs per sq. in.). Do not nick or scratch the glass or subject it to any undue pressure. When handling, use safety goggles and heavy gloves for protection. **Discharge the picture tube** by shorting the anode to chassis ground (not to the cabinet or to other mounting hardware). When discharging connect cold ground (i.e. dag ground lead) to the anode with a well insulated wire or use a grounding probe.

Avoid prolonged exposure at close range to unshielded areas of the picture tube to prevent exposure to X-ray radiation.

The **Test Picture Tube** used for servicing the chassis at the bench should incorporate safety glass and magnetic shielding. The safety glass provide shielding for the tube viewing area against X-ray radiation as well as implosion. The magnetic shield limits the X-ray radiation around the bell of the picture tube in addition to the restricting magnetic effects. When using a picture tube test jig for service, ensure that the jig is capable of handling **50.0kV** without causing X-ray radiation.

Before returning a serviced receiver to the owner, the service technician must thoroughly test the unit to ensure that is completely safe to operate. **Do not use a line isolation transformer when testing.**

Leakage Current Cold Check

Unplug the AC cord and connect a jumper between the two plug prongs.

Measure the resistance between the jumpered AC plug and expose metallic parts such as screwheads, antenna terminals, control shafts, etc. If the exposed metallic part has a return path to the chassis, the reading should be between 240kΩ and 5.2MΩ. If the exposed metallic part does not have a return path to the chassis, the reading should be infinite.

Leakage Current Hot Check (Fig. 1)

Plug the AC cord directly into the AC outlet. Do not use an isolation transformer during the check.

Connect a 1.5kΩ 10 watt resistor in parallel with a 0.15μF capacitor between an exposed metallic part and ground. Use earth ground, for example a water pipe.

Using a DVM with a 1000 ohms/volt sensitivity or higher, measure the AC potential across the resistor.

Repeat the procedure and measure the voltage present with all other exposed metallic parts.

Verify that any potential does not exceed 0.75 volt RMS. A leakage current tester (such a Simpson Model 229, Sencore Model PR57 or equivalent) may be used in the above procedure, in which case any current measure must not exceed 1/2 milliamp. If any measurement is out of the specified limits, there is a possibility of a shock hazard and the Receiver must be repaired and rechecked before it is returned to the customer.

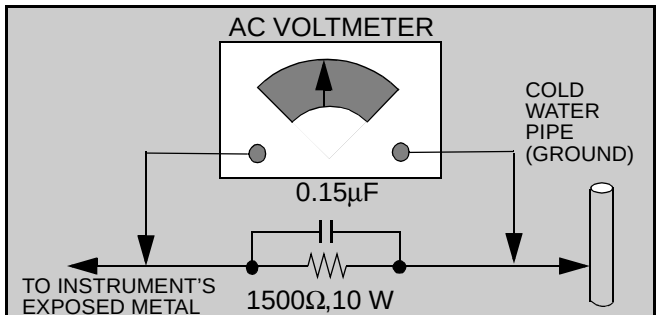

Figure 1. **Hot Check Circuit**

X-ray Radiation

WARNING: The potential source of X-ray radiation in the TV set is in the High Voltage section and the picture tube.

Note: *It is important to use an accurate, calibrated high voltage meter.*

Set the **brightness, picture, sharpness** and **color** controls to Minimum.

Measure the High Voltage. The high voltage should be **30.55kV ± 1.25kV for 25in models and 28.80kV ± 1.25kV for 20in models**. If the upper limit is out of tolerance, immediate service and correction is required to insure safe operation and to prevent the possibility of premature component failure.

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Service Notes

Note: These components are affixed with glue. Be careful not to break or damage any foil under the component or at the pins of the ICs when removing. Usually applying heat to the component for a short time while twisting with tweezers will break the component loose.

Leadless Chip Component (surface mount)

Chip components must be replaced with identical chips due to critical foil track spacing. There are no holes in the board to mount standard transistors or diodes. Some chips capacitor or resistor board solder pads may have holes through the board, however the hole diameter limits standard resistor replacement to 1/8 watt. Standard capacitor may also be limited for the same reason. It is recommended that identical components be used.

Chip resistor have a three digit numerical resistance code - 1st and 2nd significant digits and a multiplier. Example: 162 = 1600 or 1.6kΩ resistor, 0 = 0Ω (jumper).

Chip capacitors generally do not have the value indicated on the capacitor. The color of the component indicates the general range of the capacitance.

Chip transistors are identified by a two letter code. The first letter indicates the type and the second letter, the grade of transistor.

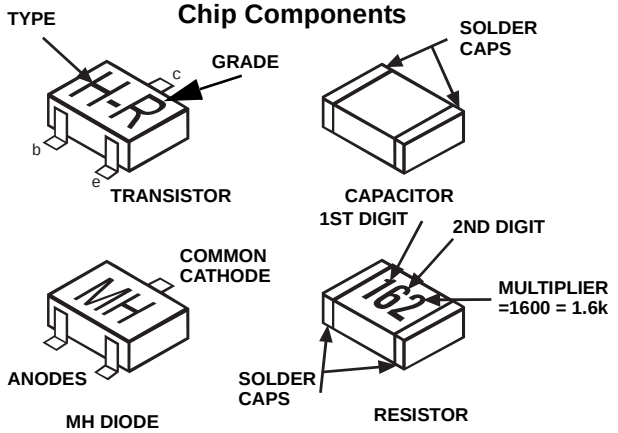
Chip diodes have a two letter identification code as per the code chart and are a dual diode pack with either common anode or common cathode. Check the parts list for correct diode number.

Component Removal

1. Use solder wick to remove solder from component end caps or terminal.
2. Without pulling up, carefully twist the component with tweezers to break the adhesive.
3. Do not reuse removed leadless or chip components since they are subject to stress fracture during removal.

Chip Component Installation

1. Put a small amount of solder on the board soldering pads.
2. Hold the chip component against the soldering pads with tweezers or with a miniature alligator clip and apply heat to the pad area with a 30 watt iron until solder flows. Do not apply heat for more than 3 seconds.

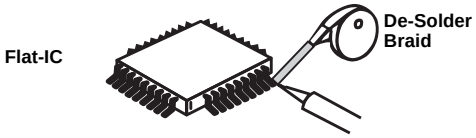


How to Replace Flat-IC

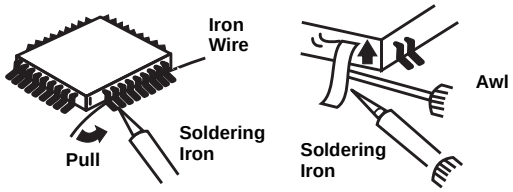
- Required Tools -

- Soldering iron
- De-solder braids
- Iron wire or small awl
- Magnifier

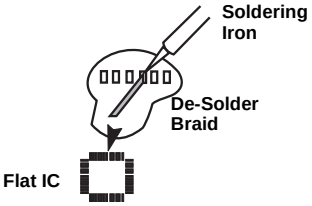
1. Remove the solder from all of the pins of a Flat-IC by using a de-solder braid.



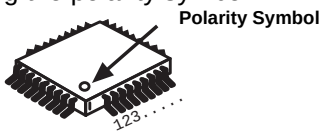
2. Put the iron wire under the pins of the Flat-IC and pull it in the direction indicated while heating the pins using a soldering iron. A small awl can be used instead of the iron wire.



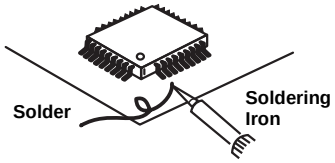
3. Remove the solder from all the pads of the Flat-IC by using a de-solder braid.



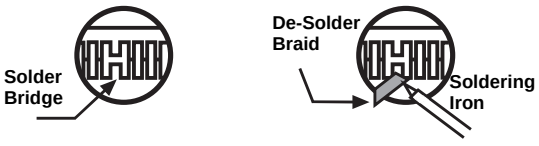
4. Position the new Flat-IC in place (apply the pins of the Flat-IC to the soldering pads where the pins need to be soldered). Properly determine the positions of the soldering pads and pins by correctly aligning the polarity symbol.



5. Solder all pins to the soldering pads using a fine tipped soldering iron.



6. Check with a magnifier for solder bridge between the pins or for dry joint between pins and soldering pads. To remove a solder bridge, use a de-solder braid as shown in the figure below.



Service Notes (Continued)

IMPORTANT: To protect against possible damage to the solid state devices due to arcing or static discharge, make certain that all ground wires and CTR DAG wire are securely connected.

CAUTION:

The power supply circuit is above earth ground and the chassis cannot be polarized. Use an isolation transformer when servicing the Receiver to avoid damage to the test equipment or to the chassis. Connect the test equipment to the proper ground (Hot ⏚) or (Cold ⏚) when servicing, or incorrect voltages will be measured.

WARNING:

This Receiver has been designed to meet or exceed applicable safety and X-ray radiation protection as specified by government agencies and independent testing laboratories.

To maintain original product safety design standards relative to X-ray radiation and shock and fire hazard, parts indicated with the symbol ⚠ on the schematic must be replaced with identical parts. Order parts from the manufacturer's parts center using the parts numbers shown in this service manual, or provide the chassis number and the part reference number.

For optimum performance and reliability, all other parts should be replaced with components of identical specification.

X-RAY PROTECTION CIRCUIT TEST

Preparation

1. Connect a High voltage meter (Capable of handle 50kV) to the CRT anode
2. Connect a variable resistor (3K) in series with a 100 ohms resistor, across (in parallel) R849.
3. Connect a jumper in R850 position (make a short on R850).

Procedure:

1. Plug receiver to120V ac. and turn it on.
2. Apply a monoscope pattern.
3. Set PICTURE and BRIGHTNESS to normal.
4. Set variable resistor to maximum level (3k)
5. Slowly decrease variable resistor value.
6. Adjust beam current between 50μA and 100μA with the SCREEN VR of FBT.
7. Adjusting the Variable REsistor, check if the set starts to loose synchrony
8. Confirm the reading from the **High Voltage** meter is **38KV for 25" models and 34KV for 20" models**.
9. Turn Off the receiver and remove the jumper.

Receiver Feature Table

FEATURE\MODEL	CT-24SX10B & CT-24SX10CB	CT-20SX10B & CT-20SX10CB	CT-F2510XB	CT-F2110XB
Chassis	MJ4M	MJ4M	MJ4M	MJ4M
# of channels	181	181	181	181
Menu language	ENG/ESP/FR	ENG/ESP/FR	ENG/ESP/FR	ENG/ESP/FR
Closed Caption	X	X	X	X
V-Chip (USA/CANADA)	X	X	X	X
75 Ohm Input	X	X	X	X
Remote Model #	EUR511502	EUR511502	EUR511502	EUR511502
Picture tube	A68LUQ085X	A68LUQ085X	A68LUQ085X	A68LUQ085X
Flat	(4:3)	(4:3)	(4:3)	(4:3)
Comb Filter	3 Dig	3 Dig	3 Dig	3 Dig
VM	X	X	X	X
Color Temp	X	X	X	X
V/A norm (X=both)	X	X	X	X
MTS/SAP/DBX	X	X	X	X
Built-in audio power	7W/CH(10%)	7W/CH(10%)	7W/CH(10%)	7W/CH(10%)
# of speakers	2	2	2	2
Speaker Type	Open Dome	Open Dome	Open Dome	Open Dome
Bass/Bl/Tre Control	X	X	X	X
AI Sound	X	X	X	X
Surround	X	X	X	X
A/V in (rear/front)	3(2/1)	3(2/1)	3(2/1)	3(2/1)
Component Input	1	1	1	1
Audio Out (FAO,VAO)	F,V	F,V	F,V	F,V
S-VHS Input (rear/front)	2(1/1)	2(1/1)	2(1/1)	2(1/1)
EPJ/HPJ/MISC	HPJ	HPJ	HPJ	HPJ
Dimensions mm (HxWxD) in	636x720x573 24.46x27.69x22.3	570x638x569 21.92x24.53x21.88	636x720x573 24.46x27.69x22.3	570x638x569 21.92x24.53x21.88
Weight (kg/lbs)	36.09/79.4	25/55	36.09/79.4	25/55
Power source (V/Hz)	120/60	120/60	120/60	120/60
Anode voltage	30.55kV±1.25kV	28.8kV±1.25kV	30.55kV±1.25kV	28.8kV±1.25kV
Video input jack	1 V_{p-p} 75Ω phono jack	1 V_{p-p} 75Ω phono jack	1 V_{p-p} 75Ω phono jack	1 V_{p-p} 75Ω phono jack
Audio input jack	500mV RMS 47kΩ	500mV RMS 47kΩ	500mV RMS 47kΩ	500mV RMS 47kΩ

Table 1. **Receiver Features**

Specifications are subject to change without notice or obligation.
Dimensions and weights are approximate.

Board Designation

Board	Part No.	CT-24SX10B & CT-24SX10CB	CT-20SX10B & CT-20SX10CB	CT-F2510XB	CT-F2110XB	Description
A-Board	TNP2AH022	AB	AC	AE	AF	Main Chassis
C-Board	TNP2AA068	AB	AC	AB	AC	CRT Drive
G-Board	TNP2AA071	AB	AC	AB	AC	Audio Circuit
H-Board	TNP2AA070	AA	AA	AA	AA	A/V Input Switch
Q-Board	TNP2AA067	AB	AC	AB	AC	H-Drive

IMPORTANT

When ordering boards, please add an “S” to the part number, for example TNP2AH022AA should be ordered as TNP2AH022AAS.

Location of Controls (Receiver)

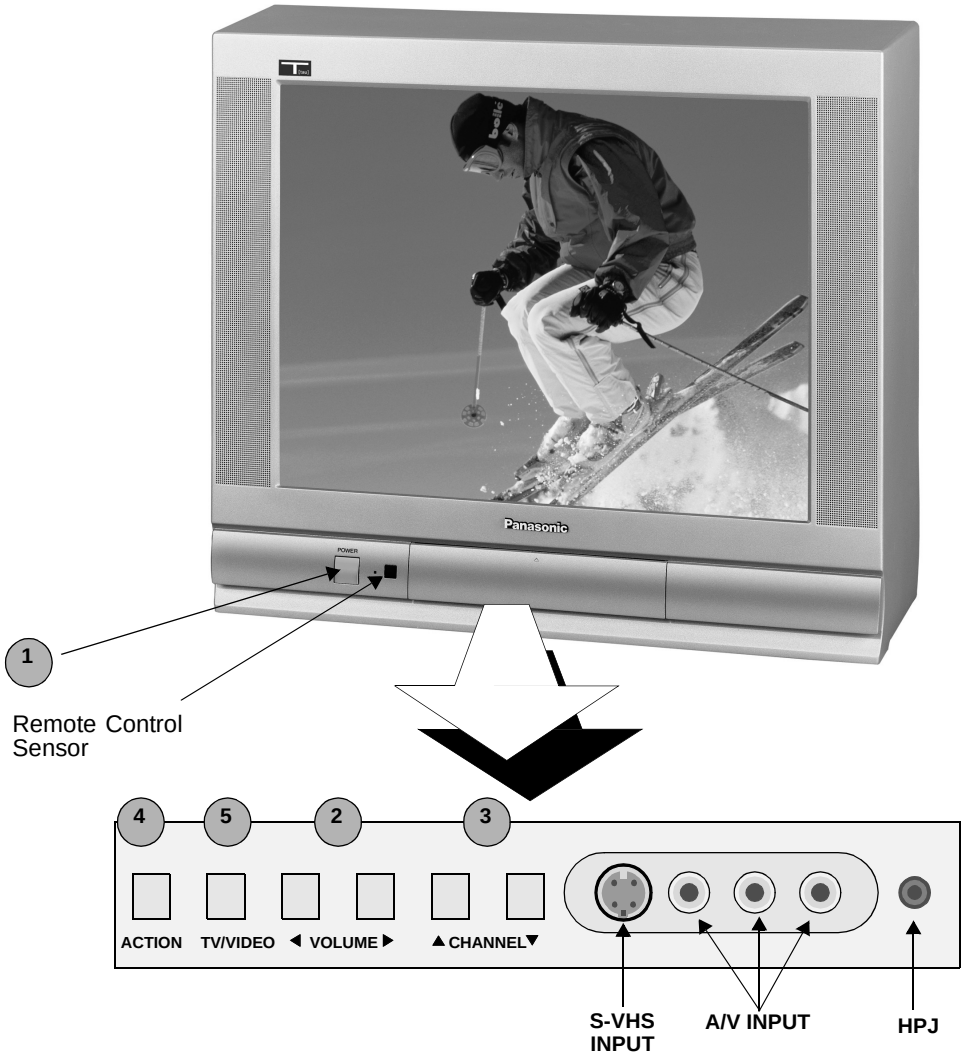


Figure 2. Location of Controls Receiver

Quick Reference Control Operation

Quick Reference Control Operation	
1	**Power Button -** Press to turn ON or OFF.
2	**Volume Buttons -** Press to adjust Sound Level, or to adjust Audio Menus, Video Menus, and select operating features when menus are displayed
3	**Channel Buttons -** Press to select programmed channels. Press to highlight desired features when menus are displayed. Also use to select Cable Converter box channels after programming Remote Control Infrared codes (the TV/AUX/CABLE switch must be set in CABLE position).
4	**Action Button -** Press to display Main Menu and access On Screen feature and Adjustment Menus.
5	**TV/Video Button -** Press to select TV or any Video Input, for the Main Picture

Location of Controls (Remote)

POWER Button
Press to turn ON and OFF.
MUTE Button
Press to mute sound. A second press resumes sound. Press also to access and delete Closed Caption display.
VCR, DVD, TV, CBL, DBS
Component function buttons
VOL (volume) Buttons
Press to adjust TV sound level. Use with Channel buttons to navigate in menus.
R-TUNE (Rapid Tune) Button.
Press to switch to the previous channel.
ACTION Button
Press to display Main Menu and access or exit On Screen features and Adjustment Menus.
REW, PLAY, FF, TV/VCR, STOP, PAUSE, REC, VCR CHANNEL
Component function buttons.

LIGHT
Press to light Remote control buttons
TV/VIDEO Button
Press to select TV or any Video input.
CH (channel) Buttons
Press to select channels. Use with volume buttons to navigate in menus.
DBS EXIT, DBS GUIDE
DBS function buttons.
RECALL Button
Press to display Time, status of Sleep Timer, Channel, Video mode and Channel Caption (Station Identifier).
“0” - “9”
Press numeric keypad to select any channel.

EUR511502

Figure 3. Location of Controls (Remote)

For more functions and information about this Remote Control, refer to the Remote Guide listed in Parts List of this manual

Disassembly for Service

Back Cover

Remove all the screws marked with an arrow(◄) from the back of the Receiver.

Note: *Screw configuration, type, and number of screws vary depending on the model of the Receiver serviced and the application; various models are covered in this Manual. Use same hardware when reassembling the receiver.*

- 3 screws at the top edge of the Receiver.
- 1 screw at each lower corner of the Receiver.
- 2 screws by the A/V bracket top edge.
- 1 screw by the A/V bracket bottom edge.

A-Board - Main Chassis (See Fig. 5)

The Q and H-Board are assembled on the Main chassis (A-Board). When servicing these boards, extension cables may be required. Cables kit can be ordered from Matsushita Services Company, see Parts List for parts number. The A-Board assembly rest on a chassis tray along with the G-Board.

Slide chassis tray out. Gently lift, tray and pull out. Disconnect plug connectors; release wire ties and holders as required for complete chassis removal.

- A-Board is secured to the chassis tray with 8 screws.
- The G-Board is secured to the chassis tray with 5 screws
- The A-Board is mated to the G-Board with to flexible connectors: A22 & A23 (G2 and G3 on the G-Board, respectively). To remove either boards, unplug the connectors on the A-Board.

Note: *Some tie-wraps that secure the wire dressings may need to be unfastened for chassis removal.*

C-Board - CRT Output

Plugs into the socket on the CRT neck.

To unplug Screen and Focus cables from CRT socket, lift the tabs on the socket and pull the cables as shown. To plug cables, close the tabs then insert the cable.

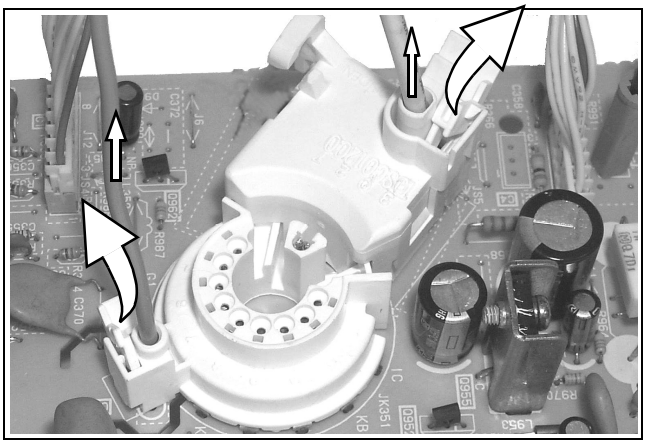


Figure 4. Focus and Screen cables.

H-Board - A/V Jacks, S-Video Connectors and Video Switch

Plugs onto the A-Board at the A11 (H11) connector

Q-Board - Horizontal Drive

Plugs onto the A-Board at the A6, A7 and A8 (QC6, QC7 and QC8) connectors. Is secured to Q551 heat sink by two screws.

Note: *Use a small flat head screwdriver to release the connector locking tabs.*

Speaker Dome

Each speaker is secured to the front cabinet with 2 screws. (See Fig. 6)

Disassembly for CRT Replacement

1. Discharge the CRT as instructed in the **Safety Precautions** (see page 2) and remove 2nd anode button from the CRT.
2. Remove Speaker Modules (R & L)
3. Disconnect:
   A-Board = Deflection Yoke (DY), Deg. Coil
   G-Board = Speakers (G8),
   C-Board = C2 Conv. Yoke, C1 DAG GND.
4. Remove Convergence and Deflection Yoke from CRT neck.
5. Perform complete removal of the Main Chassis, G-Board and CRT-Board as instructed in **Disassembly for Service.**

CRT Replacement

1. Perform **Disassembly for CRT Replacement** procedure.
2. Insure that the CRT H.V. Anode button is discharged before handling the CRT. Read the **Safety Precautions** (see page 2) on handling the picture tube.
3. Remove the components from the CRT neck and place the cabinet face down on a soft pad.
4. Note the original order for the CRT mounting hardware as they are remove from the CRT mounting brackets at each corner of the CRT.
5. Remove the CRT with the degaussing coil and the dag ground braid attached.
6. Note the original locations and mounting of the degaussing coil and the dag ground assembly to insure proper reinstallation on the replacement CRT.
   To remove and remount the degaussing coil: The degaussing coil is held in place by clampers fastened to the CRT corner ears. These clampers must be installed onto the replacement CRT prior to mounting the degaussing coil.
   To remove and remount the dag ground braid:
   a. Unhook the coil spring from the bottom corners of the CRT ears.
   b. Release the braid loop from the upper corners of the CRT ears.
7. Mount the dag ground braid on the replacement CRT. Position the degaussing coil with new ties. Dress coil as was on the original CRT.
8. Replace the components on CRT neck and reinstall into cabinet. Verify that all ground wires and circuit board plugs get connected.

Identification of Main Components

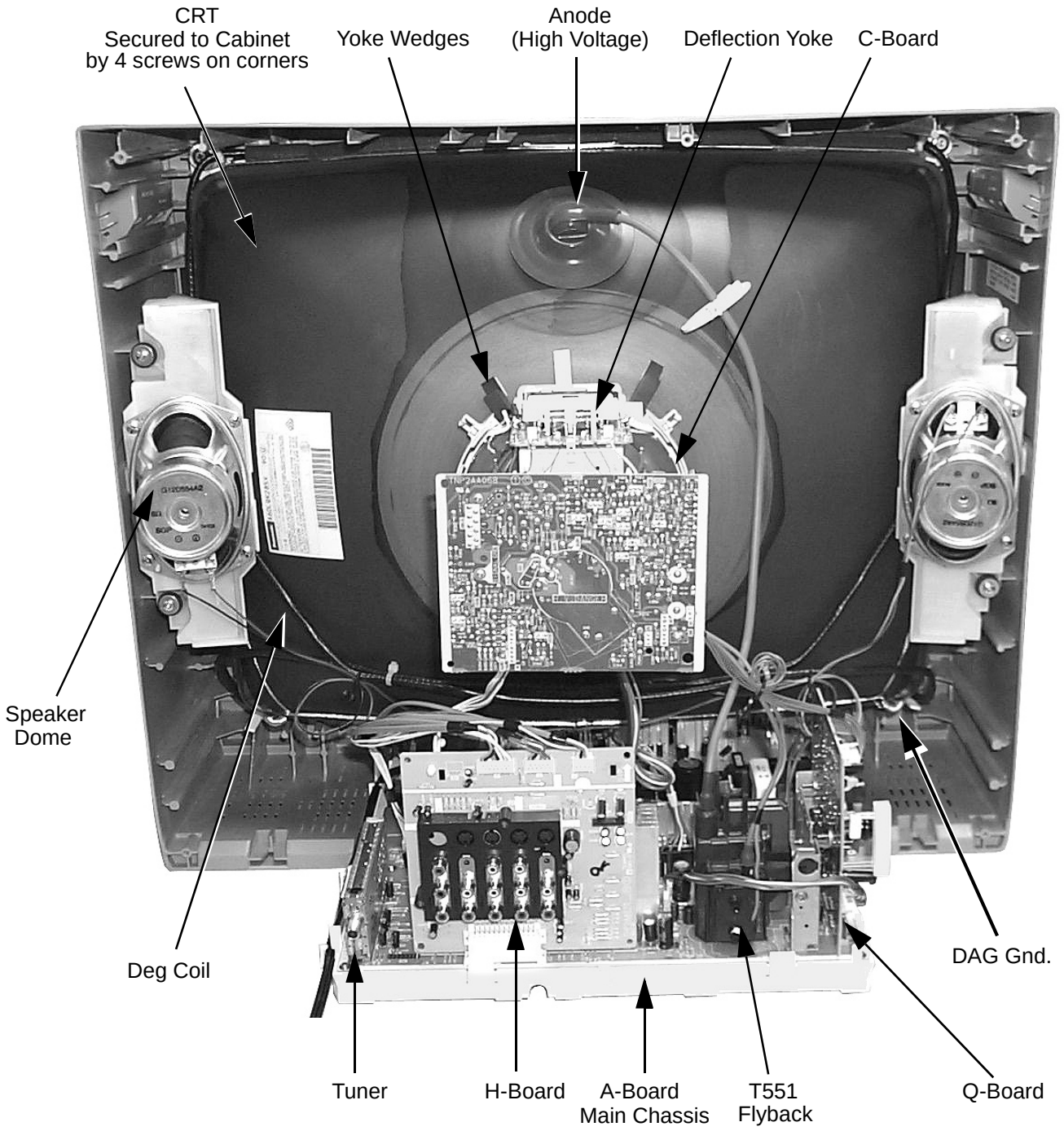


Figure 5. Components Identification

Note: After servicing the receiver, remember to dress the cables, as shown above.

Identification of Main Components

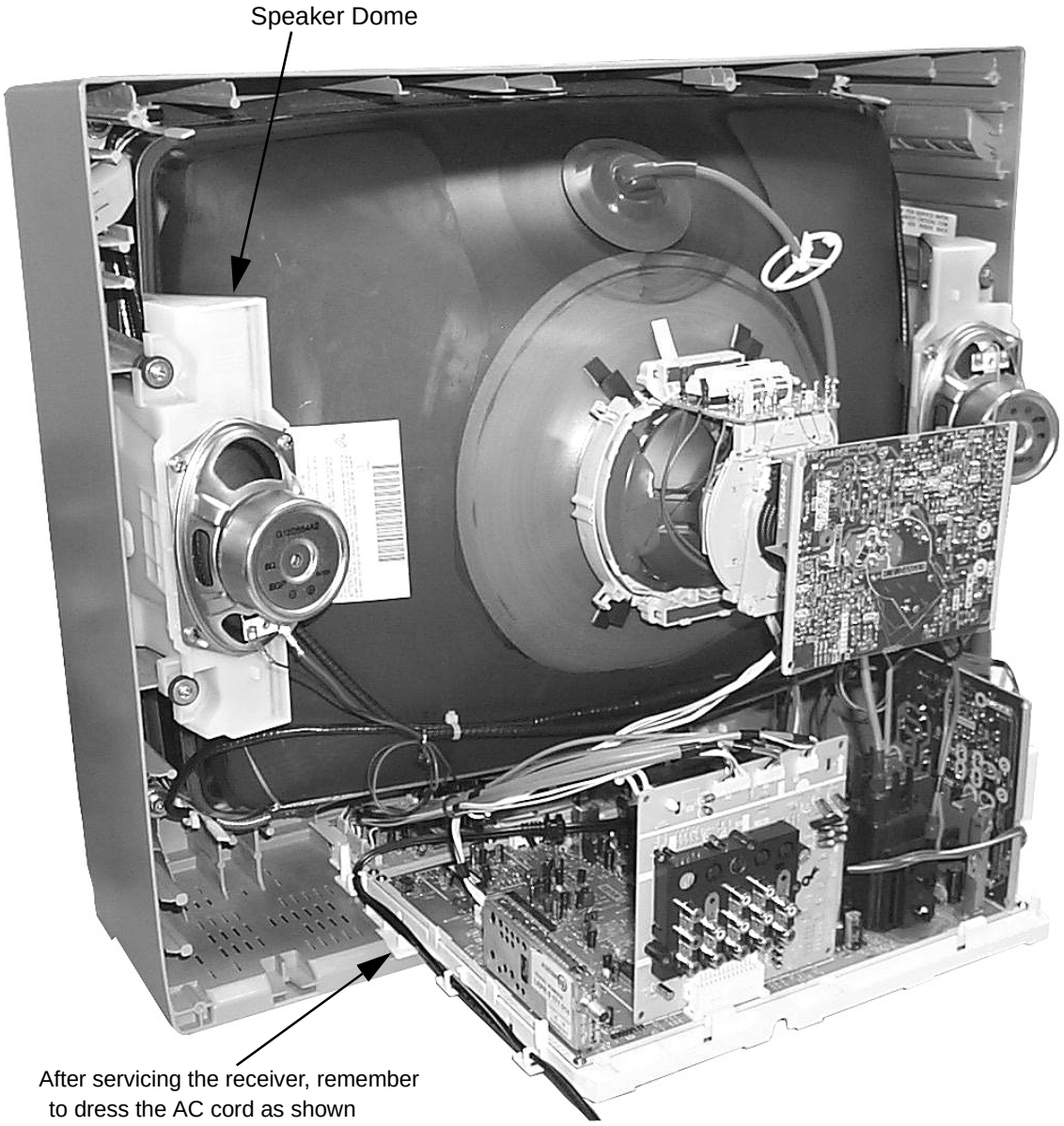


Figure 6. RECEIVER REAR VIEW DETAIL
Figure 7.

Note: After servicing the receiver, remember to dress the cables, as shown above.

Identification of Main Components

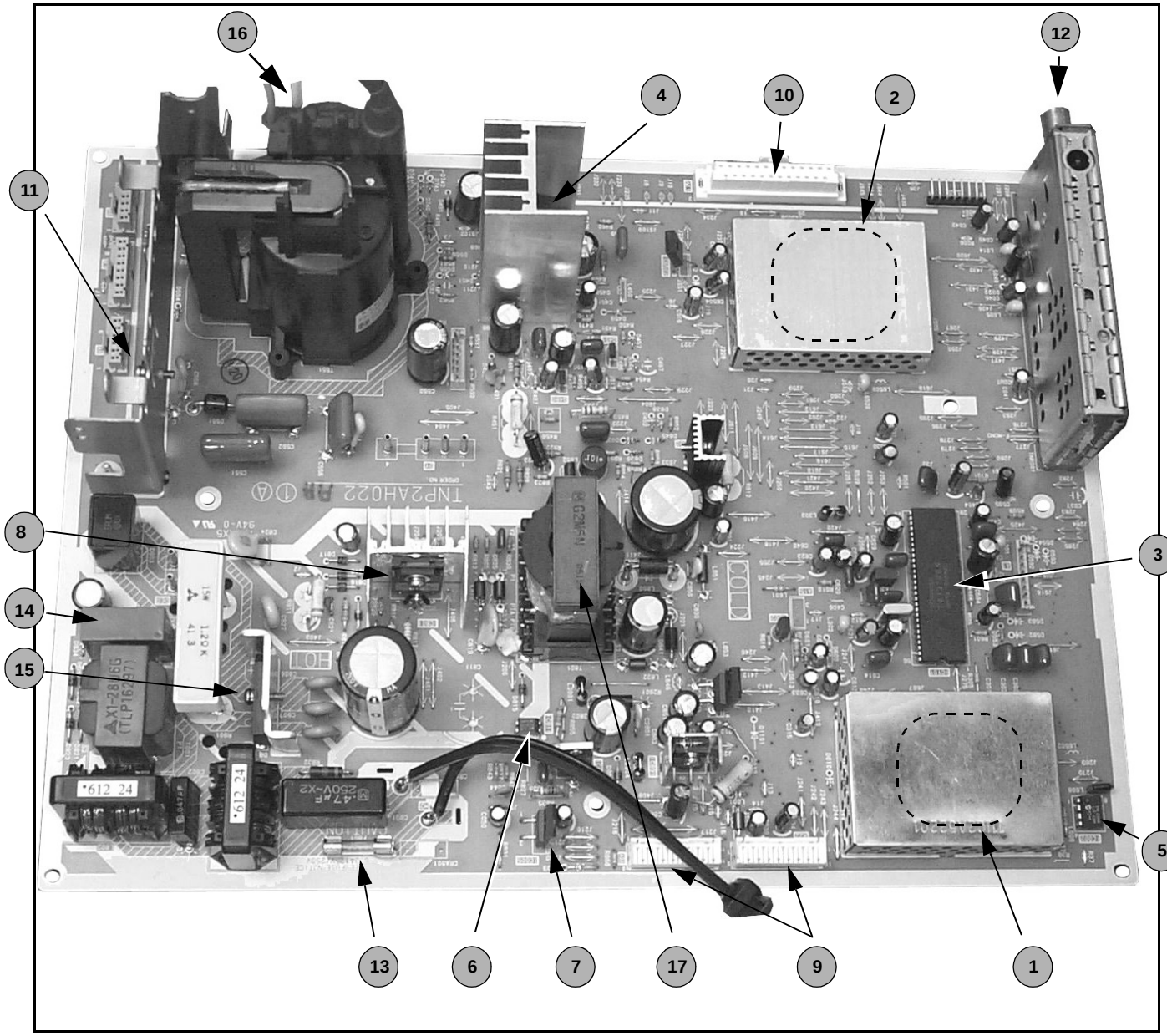


Figure 8. View of Main Board Assemblies.

NO.	LOCATION OF COMPONENTS				
INTEGRATED CIRCUITS		7	IC005	**OTHERS**	
1	IC001 MPU	8	IC801	12	Tuner
2	IC6501 Comb Filter	**CONNECTORS**		13	Fuse
3	IC101 VCJ	9	A22,A23	14	Relay
4	IC 451	10	A11	15	D801
5	IC 002	**TRANSISTORS**		16	T551 FBT
6	IC 811 COUPLER	11	Q551	17	T801

Identification of Main Components

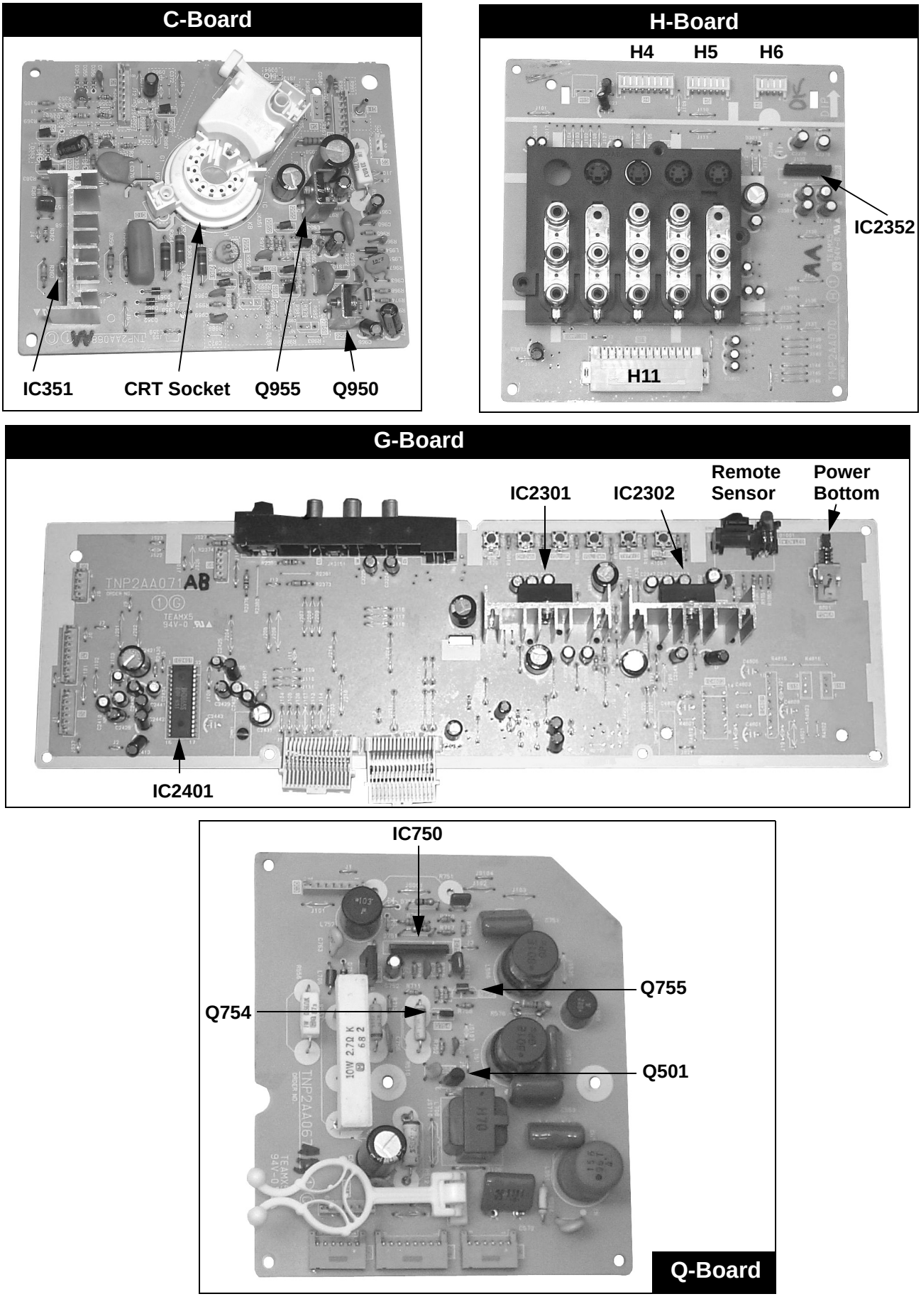


Figure 9. C, H, G and Q Board Main Components.

Purity and Convergence Procedure

Adjustment is necessary only if the CRT or the deflection yoke is replaced or if the setting was disturbed. The complete procedure consists of:

1. Vertical Raster Shift Adjustment.
2. Initial static convergence.
3. Setting the purity.
4. Final static convergence.

When the CRT or the Yoke is Replaced

Place the yoke on the CRT neck (do not tighten the clamp).

Position purity/convergence assembly as shown and tighten clamp snugly. Remove the hot-melt glue seal on assembly and position like tabs of purity device together at 12 o'clock to reduce its magnetic field effect.

Place the vertical raster shift tabs at 3 o'clock (90º from the purity and convergence tabs, see Fig. 10 and Fig. 11*)*

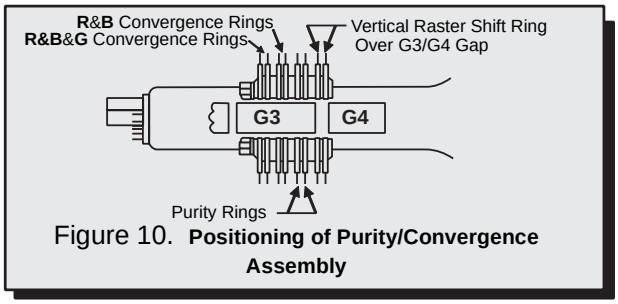


Figure 10. **Positioning of Purity/Convergence Assembly**

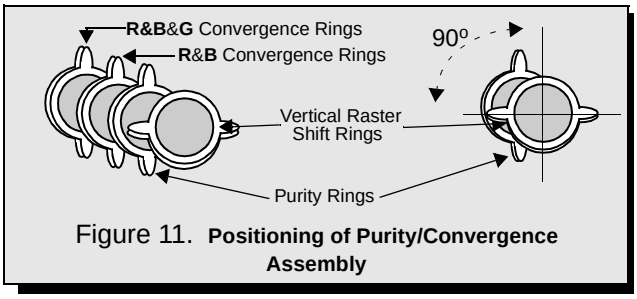


Figure 11. **Positioning of Purity/Convergence Assembly**

Turn the Receiver ON. Operate the Receiver for 60 minutes using the first Purity Check field (white screen) to stabilize the CRT.

Fully degauss the Receiver by using an external degaussing coil.

Slide the deflection yoke back and forth on the neck of the CRT until it produces a near white, uniform raster.

Vertical Raster Shift Adjustment

Apply a green pattern with a horizontal line, adjust the Deflection Yoke so that has no tilt, then secure it.

Adjust center line of the pattern with the mechanical center of the CRT, this center is determined by two marks at the side edges of the screen. To adjust the line, once the vertical raster shift tabs are place at 3 o'clock to reduce its magnetic field effect (see Fig. 10 and Fig. 11) open the tabs the same angle from the center, until the center line of the pattern becomes a straight line, centered with the marks of the CRT. (see Fig. 12)

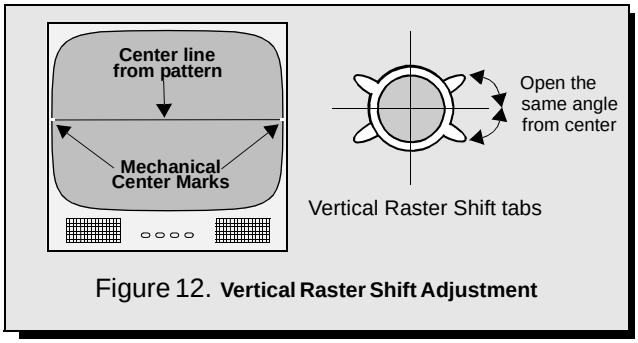


Figure 12. **Vertical Raster Shift Adjustment**

Initial Center Static Convergence

Connect a dot/cross hatch generator to the Receiver and tune in a signal. Observe misconvergence at center of the screen only.

Adjust the R&B pole magnets; by separating tabs and rotating to converge blue with red.

Adjust the R&B and R&B&G pole magnets: by separating tabs and rotating to converge blue and red (magenta) with green.

Note: *Precise convergence at this point is not important.*

Purity Adjustment

When the Receiver is in the Serviceman Mode for making electronic adjustments, press the **Recall** button on the Remote Control to enter Purity Check. (See the **Service Adjustments Electronic Controls** procedure).

Operate the Receiver for 60 minutes using the first Purity Check field (white screen) to stabilize the CRT.

Fully degauss the Receiver by using an external degaussing coil.

Press the **Recall** button on the Remote Control again until the Purity Check (green screen) appears.

Loosen the deflection yoke clamp screw and move the deflection yoke back as close to the purity magnet as possible.

Adjust the Purity rings to set the vertical green raster precisely at the center of the screen (see Fig. 13).

NOTES:
1. CRT warm up with white screen (three guns activated) is needed to stabilize the shadow mask expansion.
2. Initial center static convergence (roughly centers three gun beams) is required in order to perform purity adjustment.

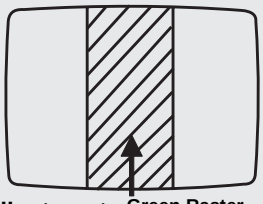


Figure 13. **Green Raster Adjustment**

Slowly move the deflection yoke forward until the best overall green screen is displayed.
Tighten the deflection yoke clamp screw.
Press the **Recall** button on the Remote Control again until the purity check (blue screen) and (red screen) appear and observe that good purity is obtained on each respective field.
Press the **Recall** button on the Remote Control again until Purity check (white screen) appears. Observe the screen for uniform white. If purity has not been achieved, repeat the above procedure.

Final Convergence Procedure (see Fig. 14 through Fig. 16):

Note: *Vertical size and focus adjustments must be completed prior to performing the convergence adjustment. Connect a dot pattern generator to the Receiver. The* ***Brightness*** *level should not be higher than necessary to obtain a clear pattern.*

Converge the red and the blue dots at the center of the screen by rotating the R&B pole Static Convergence Magnets.

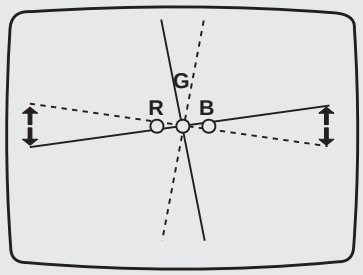
Align The converged red/blue dots with the green dots at the center of the screen by rotating the R&B&G pole Static Convergence Magnets. Melt wax with soldering iron to reseal the magnets.
Slightly tilt vertically and horizontally (do not rotate) the deflection yoke to obtain a good overall convergence.
If convergence is not reached at the edges, insert permalloy (see following section) from the DY corners to achieve proper convergence. Recheck for purity and readjust if necessary.
After vertical adjustment of the yoke, insert wedge at 11 o'clock position, then make the horizontal tilt adjustment.
Secure the deflection yoke by inserting two side wedges at 3 and 7 o'clock positions.
Apply adhesive between tab (thin portion) of wedge and CRT and place tape over the tab to secure to the CRT.

Permalloy Convergence Corrector Strip (Part No. 0FMK014ZZ)

This strip is used in some sets to match the yoke and CRT for optimum convergence. If the yoke or CRT is replaced, the strip may not be required.
First converge the set without the strip and observe the corners.

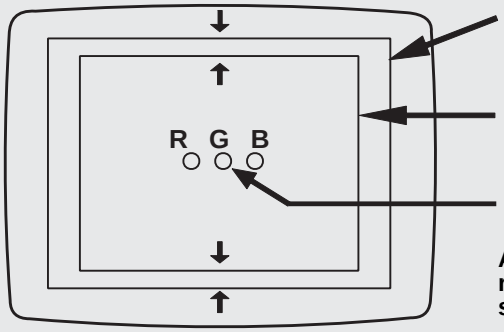
If correction is needed:

1. Place strip between CRT and yoke, in quadrant needing correction. Slowly move it around for desired results.
2. Press adhesive tightly to the CRT and secure with tape.



As the yoke is tilted vertically, the rasters produced by the outside guns rotate in opposite directions.

Figure 14. **Vertical Yoke Movement**



Raster produced from one of the outside electron beams

Raster from the other side electron beam

Static convergence magnets are set for center convergence

As the yoke is tilted horizontally, one raster gets larger while the other gets smaller

Figure 15. **Horizontal Yoke Movement**

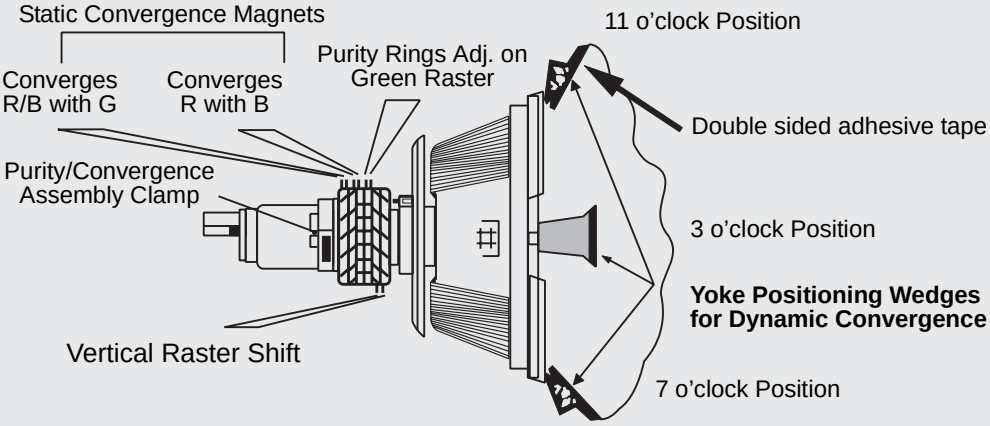
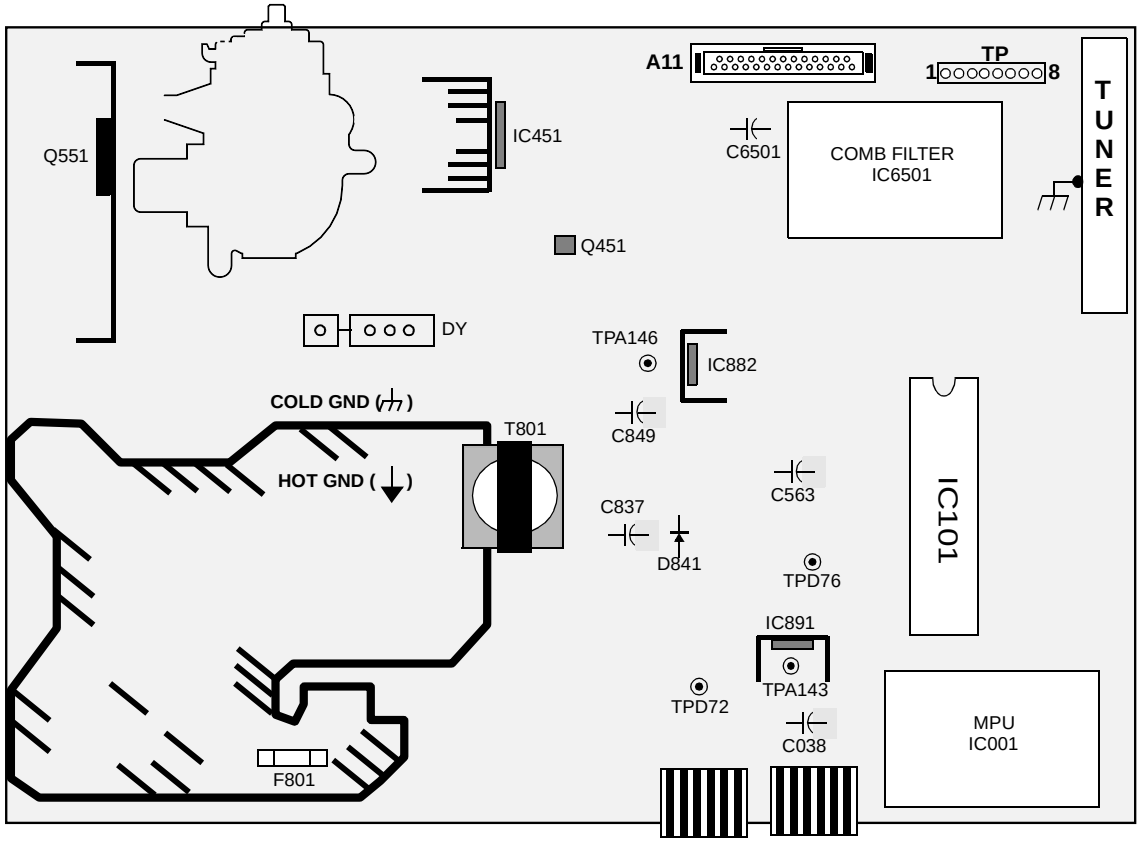


Figure 16. **Convergence Magnets and Wedges Location**

Chassis Service Adjustment Procedures

All service adjustments are factory preset and should not require adjustment unless controls and/or associated components are replaced.

Note: *Connect the (-) lead of the voltmeter to the appropriate ground. Use IC801's heat sink when the HOT ground symbol (⏚) is used. Otherwise, use COLD ground (⏚) — Tuner shield, IC451's heat sink or FA2(TP-3).(See Fig. 8)*



140.0V B+ Voltage Confirmation

1. Set the **Bright**, **Picture and Color** to Minimum by using the Picture Menu.
2. Connect the DVM between C849, **+** side (A-Board) and cold ground (⏚).
3. Confirm that B+ voltage is **140.0V ± 1.5V**. This voltage supplies B+ to the Horizontal Output & Flyback circuits.

Source Voltage Chart

120V AC line input. Set the **Bright** and the **Picture** to Minimum by using the Picture Menu. Use cold (⏚) or Hot (⏚) ground for the (-) lead of the DVM as needed.

LOCATION (A-Board)	VOLTAGE
TPD72	24 ± 2 V DC
C837 (+)	13.0 ± 2 V DC
TPA143	9.0 ±1 V DC
TPD76	12.0 ± 0.5 V DC
TPA146	5.0 ± 0.25 V DC
C6501 (+)	5.0 ± 0.25 V DC
C038 (+)	3.3 ± 0.1 V DC

Set all adjustments to normal level.

High Voltage Check

1. Select an active TV channel and confirm that horizontal is in sync.
2. Adjust Brightness and Picture using Picture Icon menu so video just disappears.
3. Confirm B+ 140V is within limit.
4. Using a high voltage meter confirm that the High Voltage is **30.55kV ± 1.25kV for 25in models and 28.80kV ± 1.25kV for 20in models**.

Deflection Circuit Preadjustment

Preparation:

1. Connect a High voltage meter (Capable of handle 50kV) to the CRT anode.
2. Connect the set to AC line and turn it on.

Procedure:

1. Apply a crosshatch pattern.
2. Set Picture Controls to minimum to obtain a black image.
3. Verify that the High Voltage meter reading is **30.55kV ± 1.25kV for 25in models and 28.80kV ± 1.25kV for 20in models**
4. If the upper limit is out of tolerance, immediate service and correction is required to insure safe operation and to prevent the possibility of premature component failure.

Set Picture Controls to normal.

Serviceman Mode (Electronic Controls)

This Receiver has electronic technology using the I²C Bus Concept. It performs as a control function and it replaces many mechanical controls. Instead of adjusting mechanical controls individually, many of the control functions are now performed by using "On Screen Display Menu". (The **Serviceman Adjustment Mode**.)

Note: *It is suggested that the technician reads all the way through and understand the following procedure for Entering/Exiting the* ***Serviceman Adjustment Mode****; then proceed with the instructions working with the Receiver. When becoming familiar with the procedure, the Flow Chart for Serviceman Mode may be used as a quick guide.*

Quick Entry to Serviceman Mode:

When minor adjustments need to be done to the electronic controls, the method of Entering the serviceman Mode without removal of the cabinet back is as follows using the Remote Control:

1. Select SET-UP icon and select CABLE mode.
2. Select TIMER icon and set SLEEP time for 30 Min.
3. Press "ACTION" twice to exit menus.
4. Tune to the Channel 124.
5. Adjust VOLUME to minimum (0).
6. Press VOL ◀ (decrease) **on Receiver**. Red "CHK" appears in upper corner.

Note: *After Receiver is set into SERVICEMAN mode, set TIMER back to NO.*

To toggle between Aging and Serviceman modes:

While the "CHK" is displayed on the left top corner of the CRT, pressing "ACTION" and "VOL" UP on the TV simultaneously will toggle between the modes. Red "CHK" for Serviceman and yellow "CHK" for Aging.

7. **Press Power** on the **Remote Control** to select one of seven Serviceman Adjustment Modes.
   1. **B**= Serviceman VCJ SUB-DATA ADJUSTMENTS.
   2. **C**= Serviceman VCJ CUT-OFF ADJUSTMENTS.
   3. **D**= Serviceman GEOMETRIC ADJUSTMENTS.
   4. **S** = Serviceman S OPTION ADJUSTMENTS.
   5. **X** = Serviceman GEOMAGNETIC ADJUSTMENTS.
6. "**CHK**" = Normal operation of CHANNEL ▲▼ and VOLUME ◀ ▶.

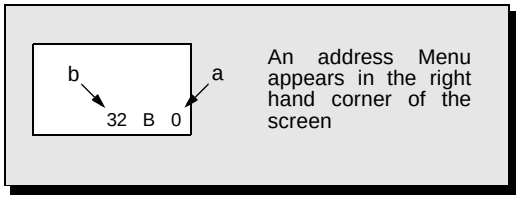


Figure 17. Serviceman Mode Menu Adjustments.

Exiting the Serviceman Mode:

Press **Action** and **Power** on the **Receiver** simultaneously for at least 2 seconds.

THE RECEIVER EXITS SERVICEMAN MODE.

The Receiver momentarily shuts off; then comes back on tuned to channel 3 with a preset level of sound. Any programmed channels, channels caption data and some others user defined settings will be erased.

IMPORTANT NOTE:
Always Exit the Serviceman Mode Following Adjustments.

To Check Purity:

Press **Recall** on the **Remote Control** when in Serviceman Mode (red "CHK" is displayed) to enter the Purity Field Check Mode.

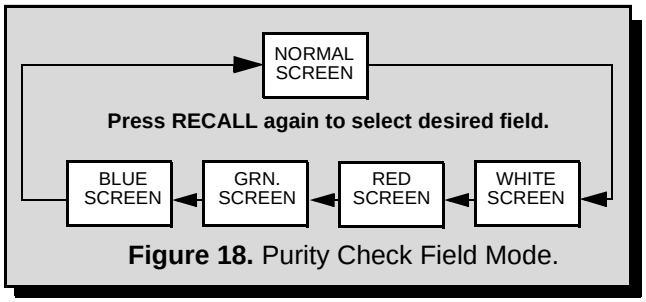


Figure 18. Purity Check Field Mode.

Helpful Hints

Entering Serviceman Mode (Back-Open Method)

- While the Receiver is ON and operating in Normal Mode, momentarily short test point **FA1** (TP8) to Cold Ground (⏚) **FA2** (TP3) A-Board.

  The Receiver enters the Aging Mode.
  Yellow letters "CHK" appear in the upper left corner of the CRT.
  (The Volume Up/Down will adjust rapidly).

Press the **Power Button** on the **Remote Control** to select the Serviceman Adjustment.

For Adjustments:

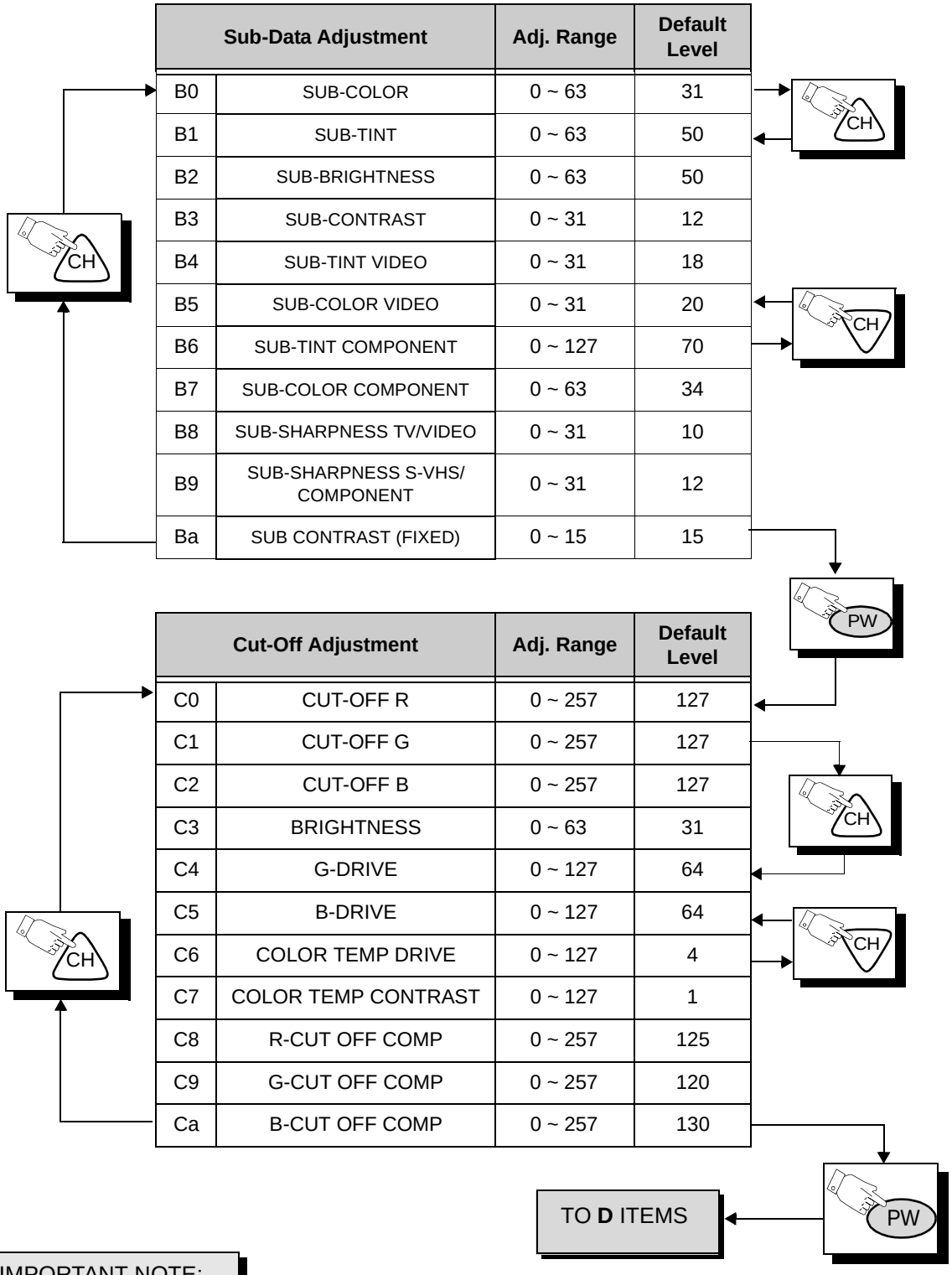
1. **Press Channel Up/Down** on the **Remote Control** to select one of the available Service Adjustments (**a** in Fig. 17).

Note: *Write Down the original value set (**b** in* Fig. 17*) for each address before modifying anything. It is easy to erroneously adjust the wrong item.*

2. **Press Volume Up/Down** on the **Remote Control** to adjust the level of the selected Service Adjustment (**b** in Fig. 17).

Sub-Data Adjustment		Adj. Range	Default Level
B0	SUB-COLOR	0 ~ 63	31
B1	SUB-TINT	0 ~ 63	50
B2	SUB-BRIGHTNESS	0 ~ 63	50
B3	SUB-CONTRAST	0 ~ 31	12
B4	SUB-TINT VIDEO	0 ~ 31	18
B5	SUB-COLOR VIDEO	0 ~ 31	20
B6	SUB-TINT COMPONENT	0 ~ 127	70
B7	SUB-COLOR COMPONENT	0 ~ 63	34
B8	SUB-SHARPNESS TV/VIDEO	0 ~ 31	10
B9	SUB-SHARPNESS S-VHS/ COMPONENT	0 ~ 31	12
Ba	SUB CONTRAST (FIXED)	0 ~ 15	15

Cut-Off Adjustment		Adj. Range	Default Level
C0	CUT-OFF R	0 ~ 257	127
C1	CUT-OFF G	0 ~ 257	127
C2	CUT-OFF B	0 ~ 257	127
C3	BRIGHTNESS	0 ~ 63	31
C4	G-DRIVE	0 ~ 127	64
C5	B-DRIVE	0 ~ 127	64
C6	COLOR TEMP DRIVE	0 ~ 127	4
C7	COLOR TEMP CONTRAST	0 ~ 127	1
C8	R-CUT OFF COMP	0 ~ 257	125
C9	G-CUT OFF COMP	0 ~ 257	120
Ca	B-CUT OFF COMP	0 ~ 257	130



IMPORTANT NOTE:
Always Exit the Serviceman Mode Following Adjustments.

Press the **Power Button** on the **Remote Control** to select the Serviceman Adjustment.

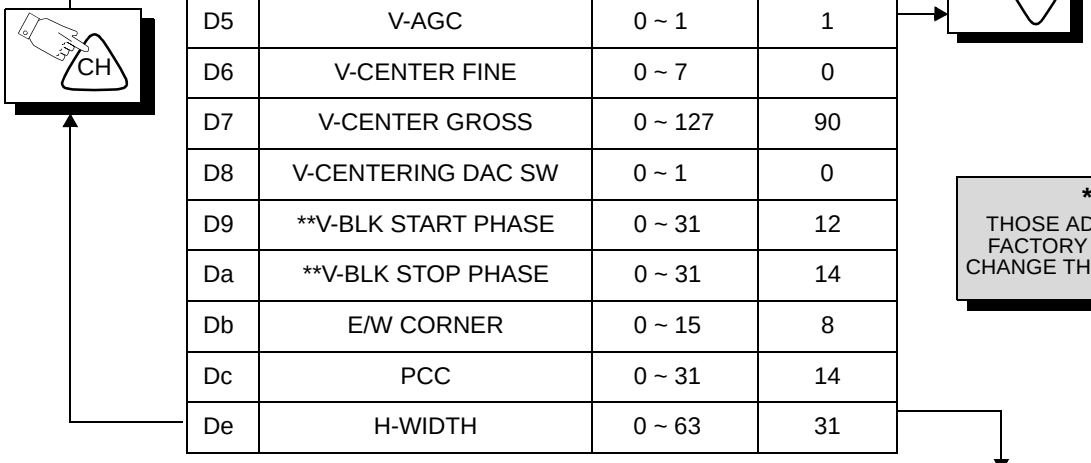
For Adjustments:

1. **Press Channel Up/Down** on the **Remote Control** to select one of the available Service Adjustments (**a** in Fig. 17).

Note: *Write Down the original value set (**b** in* Fig. 17*) for each address before modifying anything. It is easy to erroneously adjust the wrong item.*

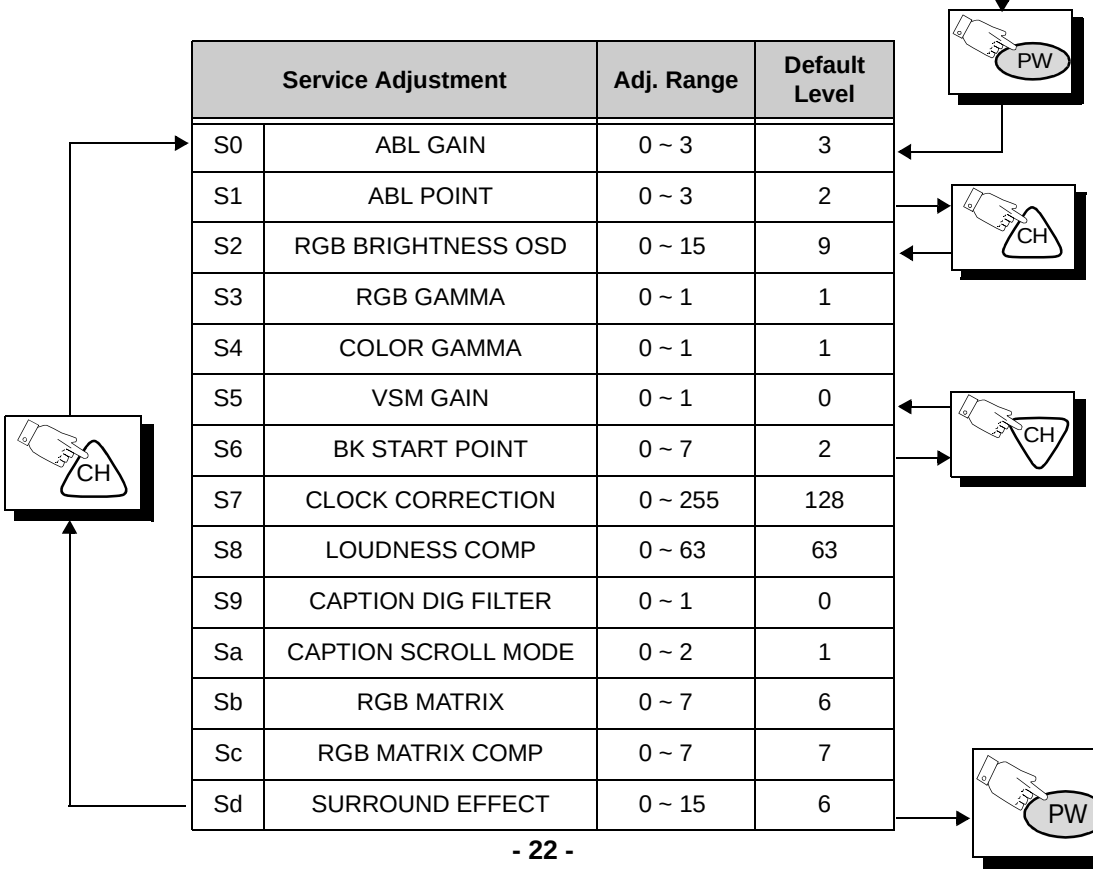
2. **Press Volume Up/Down** on the **Remote Control** to adjust the level of the selected Service Adjustment (**b** in Fig. 17).

Geometric Adjustment		Adj. Range	Default Level
D0	H- POSITION	0 ~ 31	16
D1	V-AMPLITUDE	0 ~ 63	31
D2	V-S CORRECTION	0 ~ 7	4
D3	V-LIN CORREECTION	0 ~ 15	8
D4	E/W TRAPEZIUM	0 ~ 15	11
D5	V-AGC	0 ~ 1	1
D6	V-CENTER FINE	0 ~ 7	0
D7	V-CENTER GROSS	0 ~ 127	90
D8	V-CENTERING DAC SW	0 ~ 1	0
D9	**V-BLK START PHASE	0 ~ 31	12
Da	**V-BLK STOP PHASE	0 ~ 31	14
Db	E/W CORNER	0 ~ 15	8
Dc	PCC	0 ~ 31	14
De	H-WIDTH	0 ~ 63	31



****NOTE**
THOSE ADJUSTMENTS ARE FACTORY PRESET. DO NOT CHANGE THE ORIGINAL VALUE.

Service Adjustment		Adj. Range	Default Level
S0	ABL GAIN	0 ~ 3	3
S1	ABL POINT	0 ~ 3	2
S2	RGB BRIGHTNESS OSD	0 ~ 15	9
S3	RGB GAMMA	0 ~ 1	1
S4	COLOR GAMMA	0 ~ 1	1
S5	VSM GAIN	0 ~ 1	0
S6	BK START POINT	0 ~ 7	2
S7	CLOCK CORRECTION	0 ~ 255	128
S8	LOUDNESS COMP	0 ~ 63	63
S9	CAPTION DIG FILTER	0 ~ 1	0
Sa	CAPTION SCROLL MODE	0 ~ 2	1
Sb	RGB MATRIX	0 ~ 7	6
Sc	RGB MATRIX COMP	0 ~ 7	7
Sd	SURROUND EFFECT	0 ~ 15	6



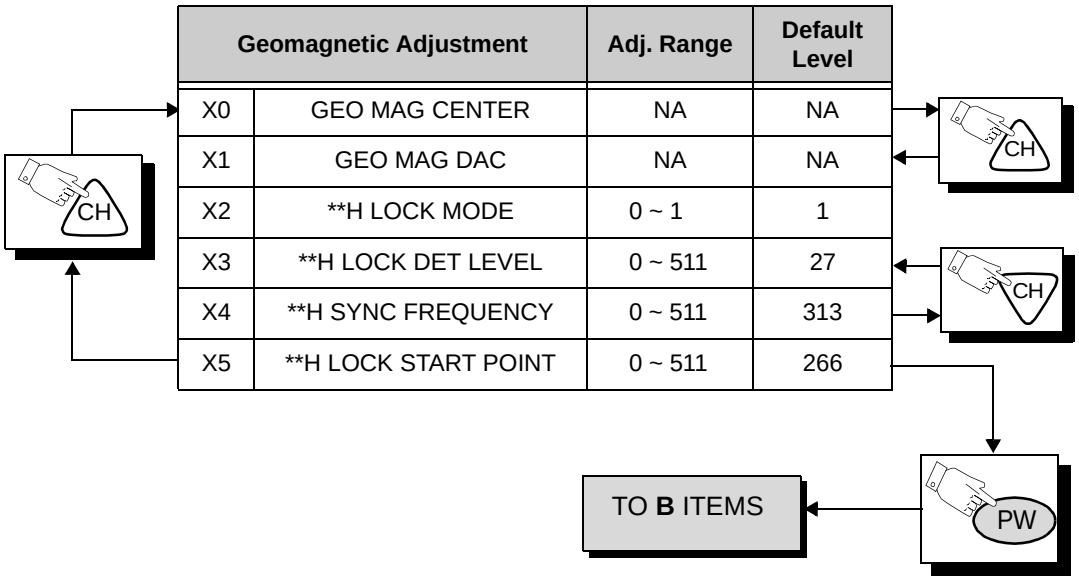
Press the **Power Button** on the **Remote Control** to select the Serviceman Adjustment.

For Adjustments:

1. **Press Channel Up/Down** on the **Remote Control** to select one of the available Service Adjustments (**a** in Fig. 17).

Note: *Write Down the original value set (**b** in* Fig. 17*) for each address before modifying anything. It is easy to erroneously adjust the wrong item.*

2. **Press Volume Up/Down** on the **Remote Control** to adjust the level of the selected Service Adjustment (**b** in Fig. 17).



Geomagnetic Adjustment		Adj. Range	Default Level
X0	GEO MAG CENTER	NA	NA
X1	GEO MAG DAC	NA	NA
X2	**H LOCK MODE	0 ~ 1	1
X3	**H LOCK DET LEVEL	0 ~ 511	27
X4	**H SYNC FREQUENCY	0 ~ 511	313
X5	**H LOCK START POINT	0 ~ 511	266

****NOTE**
THOSE ADJUSTMENTS ARE FACTORY PRESET. DO NOT CHANGE THE ORIGINAL VALUE.

IMPORTANT NOTE:
Always Exit the Serviceman Mode Following Adjustments.

Instructional Flow Chart for Serviceman Mode

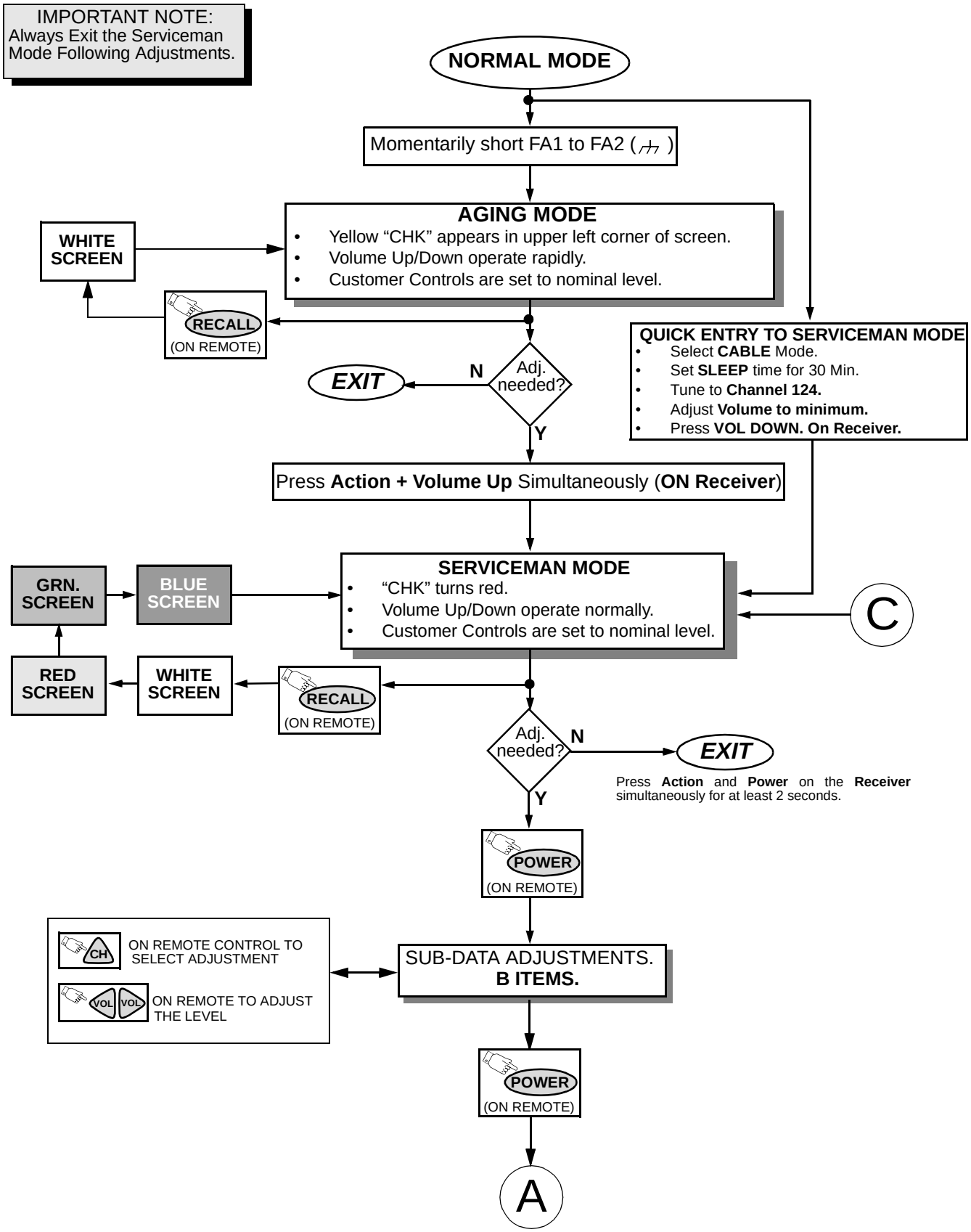


Figure 19. Flow Chart for Serviceman Mode.

Instructional Flow Chart for Serviceman Mode - Continued

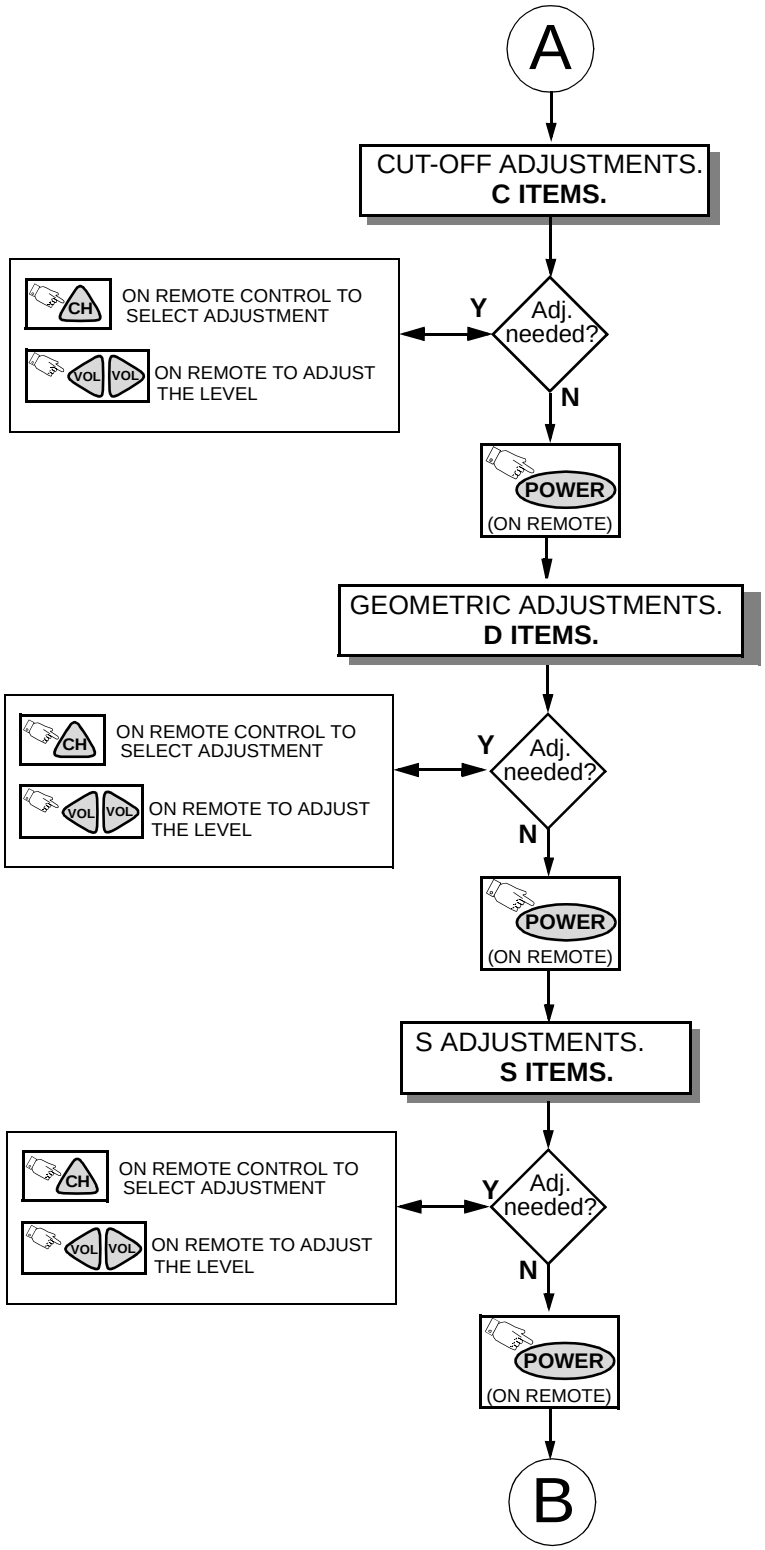
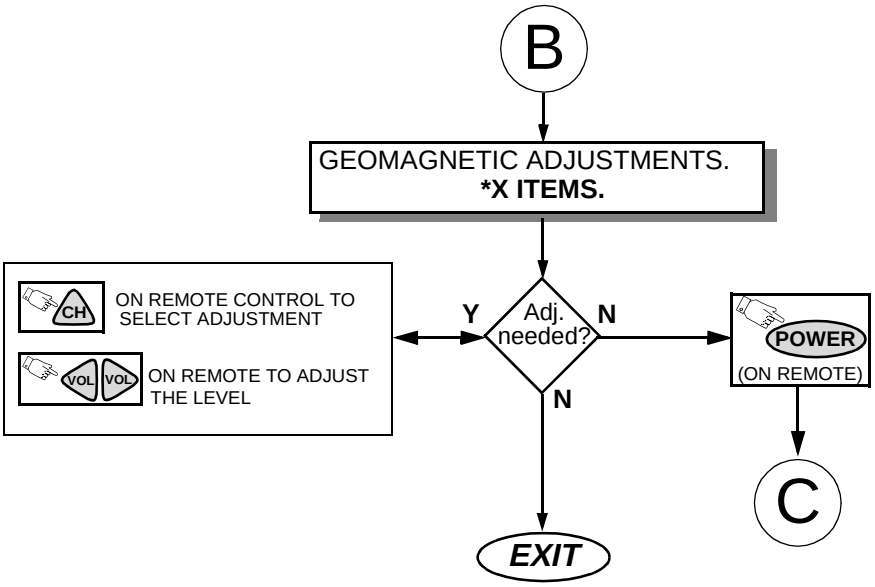


Figure 20. Flow Chart for Serviceman Mode (Continued).

IMPORTANT NOTE:
Always Exit the Serviceman Mode Following Adjustments.

Instructional Flow Chart for Serviceman Mode - Continued



Press **Action** and **Power** on the **Receiver** simultaneously for at least 2 seconds.

***NOTE**

THOSE ADJUSTMENTS ARE FACTORY PRESET. DO NOT CHANGE THE ORIGINAL VALUE.
X0 & X1 ARE NO APPLICABLE. REGISTERS HAVE NO EFFECT IN THE RECEIVER.

IMPORTANT NOTE:
Always Exit the Serviceman Mode Following Adjustments.

Figure 21. Flow Chart for Serviceman Mode (Continued)

Service Adjustments (Electronic Controls)

Note: *Turn the Receiver ON. Operate the Receiver for 60 minutes using the first Purity Check field (white screen) to stabilize the CRT. Fully degauss the Receiver by using an external degaussing coil.*

Sub-Brightness

Serviceman DAC Adjustment (B2)

Adjustment of this control is important for setting proper operation of customer brightness and picture controls. This adjustment must be made after Sub-Contrast or Color Temperature adjustments are made. **Do not adjust** the SCREEN VR after the Sub-Brightness is set.

Preparation:

3. Preset the following controls:
   - Tint. . . . . .Center.
   - Color . . . . . .Center.
   - Picture . . . . . .Max.
4. Apply a Black and White cross pattern.
5. Operate the Receiver for a minimum of 30 minutes prior to performing this adjustment.

Procedure:

In the Serviceman Mode for making electronic adjustments, select the DAC adjustment (B2) and adjust until the 7.5 IRE part is the same light output as 3 IRE part.

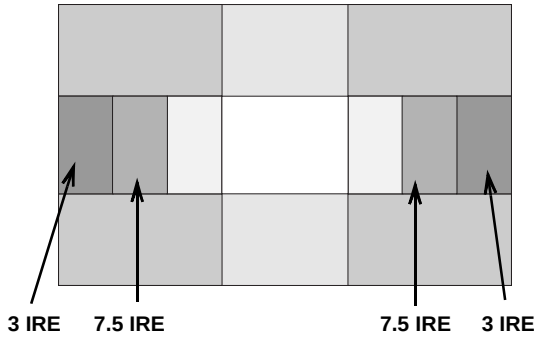


Figure 22. **Sub-Bright Pre adjustment**

You may set the accurate value following the Preparation steps and the Procedure step No. 1 of the Sub-Contrast adjustment described below.

Sub-Contrast

Serviceman DAC Adjustment (B3)

This adjustment is factory set. **Do not adjust** unless repairs are made to associated circuit, the CRT Board or when the CRT is replaced.

Preparation:

1. Apply a color bar signal pattern with 87.5% modulation, 70% saturated color bar with a 100 IRE white and 7.5 black.

Note: *The pattern used in this procedure is an EIA color bar pattern with 87.5% modulation with 100 IRE white and 7.5 black. Correlate the information in this procedure to the pattern used if another signal is used.*

2. Preset the following controls:
   - Brightness . . . . . .Center.
   - Color . . . . . .Min.
   - Picture . . . . . .Max.
   - Sharpness . . . . . .Center.
3. Set RGB Gamma Register OFF (S3 to 0)
4. Connect the oscilloscope to TP47R (A-Board, below IC101).
5. Set the scope time base to 20μs (horizontal).
6. Connect a jumper from TPD2 to ground (⏚).

Procedure:

1. In the Serviceman Mode, select DAC Sub-Brightness Adjustment (B2) and adjust for **1.5~1.9Vp-p** between blanking and 7.5 IRE level.

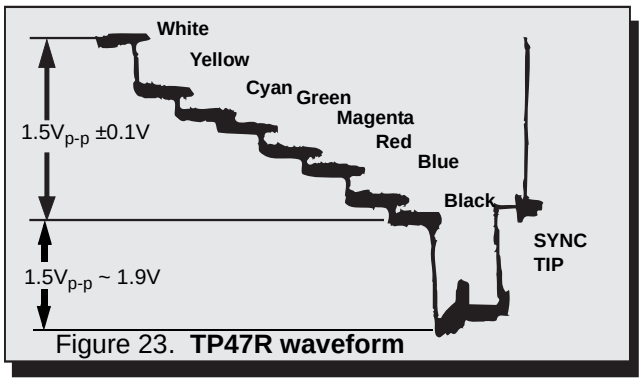


Figure 23. **TP47R waveform**

2. In the Serviceman Mode for electronic adjustments, select DAC Sub-Contrast Adjustment (B3) and adjust for **1.5Vp-p ± 0.1V** from white level to black level on video waveform (see video waveforms detail, Fig. 23).
3. Remove the jumpers (Preparation step 6).
4. Set S3 to 1.

Tint/Color Adjustment

Serviceman DAC Adjustment (B1) (B0)

Preparation:

1. Preset the following controls:)
   - Tint. . . . . Center.
   - Color . . . . . Center.
   - Picture . . . . . Max.
   - Sharpness . . . . . Min.
   - Bright . . . . . Min.
   - Color Temp . . . . . Normal.
2. Set RGB Gamma Register OFF (S3 to 0).
3. Connect a jumper from TPD2 to ground (⏚).

Service Adjustments (Electronic Controls, cont.)

Procedure:
1. Apply a Color bar pattern.
2. Connect oscilloscope to TP47B (Blue Output) in A-board, below IC101.
3. Select DAC **Sub-Tint (B1)** and adjust waveform so that peaks 7 is halfway between peaks 5 and 6 as shown in Fig. 24

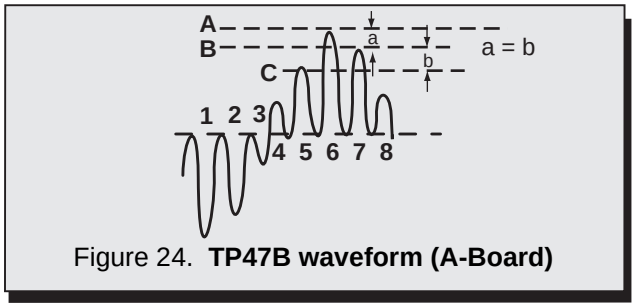


Figure 24. **TP47B waveform (A-Board)**

4. Connect oscilloscope to TP47R (Red Output), in A-Board, below IC101.
5. Select DAC **Sub-Color B(0)** and adjust for waveform to measure **1.3V ± 0.05Vp-p**, See Fig. 25

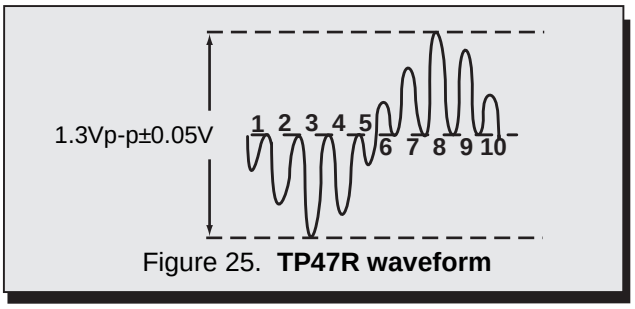


Figure 25. **TP47R waveform**

6. Remove jumpers (Preparation step 3).
7. Set DAC **S3 to 1.**
8. Confirm that the phase can be changed about ± 30^{o} by TINT CONTROL. (Tint ratio AB=1, AC=2).

Color Temperature Adjustment (B/W Tracking)

Serviceman DAC Adjust. (C0) (C1) (C2) (C4) (C5)
Minor Touch-Up Method

OBSERVE low and high brightness areas of a B/W picture for proper tracking. Adjust only as required for "good gray scale and warm highlights".

1. LOW LIGHT areas – In Serviceman Mode for making electronic adjustments, select Cutoff (C0) RED, (C1) GRN, (C2) BLU and adjust the picture for gray.
2. HIGH LIGHT areas – In Serviceman Mode for making electronic adjustments, select Drive (C4) GREEN, (C5) BLUE and adjust the picture for warm whites.

Complete Adjustment

Preparation:
1. Turn the Receiver "ON" and allow 45 minutes warm up at high brightness.
2. Apply a color bar signal with color "OFF".
3. Set Picture Icon Menu Video controls to Normalize.
4. Turn the SCREEN control (part of FBT T551) fully counterclockwise.
5. Set Service Switch On:
   Connect a jumper from Q451 (Base) to R812 +5V side. (TPA146 or IC882-3)
6. Preset the following Serviceman DACs for best results:
   - Red Cut-Off **C0** . . .128
   - Green Cut-Off **C1** . . .128
   - Blue Cut-Off **C2** . . .128
   - Green Drive **C4** 64
   - Blue Drive **C5** 64

Procedure:
1. Connect the oscilloscope to TP47R.
2. In Serviceman Mode for making electronic adjustment, select the Sub-Bright DAC (B2).
3. Observe oscilloscope waveform and adjust serviceman mode **Sub-Bright** DAC **(B2)** until **2.5V** above DC ground is measured (See Fig. 26)

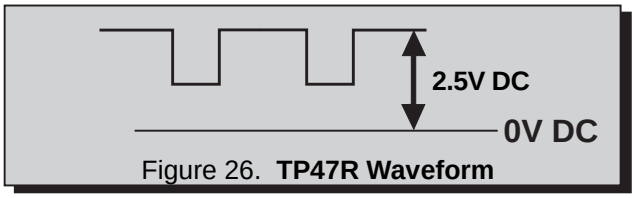


Figure 26. **TP47R Waveform**

4. Connect scope to RED Cathode (KR) on CRT-Board
5. In Serviceman mode for making electronic adjustments, select **RED CUTOFF** DAC **(C0)**
6. View scope trace at Horizontal rate and adjust Serviceman Mode DAC **(C0)** for the scanning period to be **170V for 25in models and 160V for 20in models** above DC ground (See Fig. 27.)

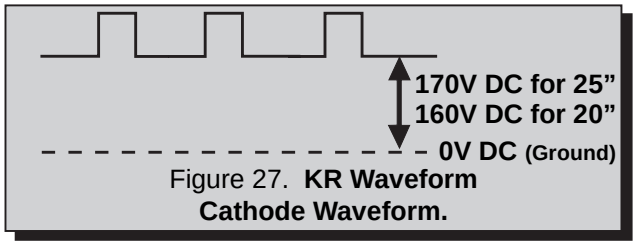


Figure 27. **KR Waveform**
Cathode Waveform.

7. Write the same data (C0 register value) to Green **C1** and Blue **C2**.
8. Turn SCREEN VR (Part of FBT) slowly clockwise until a faint horizontal line in color appears.
9. Using the Serviceman Mode Dac CUTOFF adjustments, increase their setting to produce a white horizontal line.
10. Confirm a good gray scale by viewing B/W color bar Pattern.
11. If correction is needed perform **Minor Touch-Up Method.**
12. Perform **Sub-Brightness** adjustment procedure if needed.

Service Adjustments (Electronic Controls, cont.)

Note: *Turn the Receiver ON. Operate the Receiver for 60 minutes using the first Purity Check field (white screen) to stabilize the CRT. Fully degauss the Receiver by using an external degaussing coil.*

Horizontal Center Adjustment

Serviceman DAC Adjustment (D0)

Preparation:

1. Preset the following controls:)
   - Picture . . . . . Max.
   - Bright . . . . . Center.

Procedure:

1. Apply a monoscope pattern.
2. Adjust Horizontal center register to center the monoscope pattern on the CRT.

E-W Pincushion Correction

Serviceman DAC Adjustment (Dc)

Preparation:

1. Apply a Crosshatch pattern
2. Normalize the Picture Icon Video adjustments.
3. Set:
   - Brightness . . . . . .Center.
   - Sharpness . . . . . .Center
   - Picture . . . . . .Max.

Procedure:

1. Enter Serviceman Mode, select DAC **Dc**. Adjust for 1st and 3rd vertical lines on E&W sides to be straight (See Fig. 28)

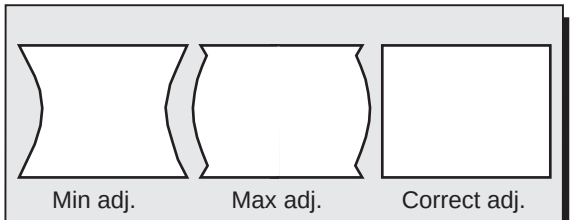


Figure 28. **E-W Pincushion Adjustment**

2. Select DAC **Db** and adjust vertical lines so that the top edge is straight (SeeFig. 29)

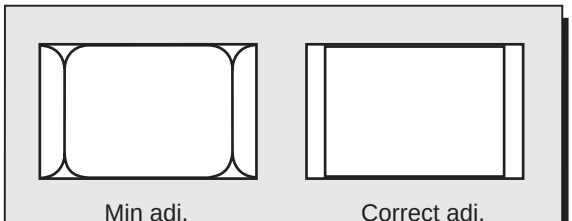


Figure 29. **Corner Pincushion Adjustment**

Horizontal Width Adjustment

Serviceman DAC Adjustment (Dd)

Preparation:

1. Apply a monoscope pattern.
2. Adjust **D0 Horizontal Center** until picture is centered.
3. Verify Horizontal Width is in normal range.
4. Apply a crosshatch pattern.
5. Adjust **Dc, E-W Pincushion** and **Db, Corners Pincushion** to obtain outside vertical lines as straight as possible.

Procedure:

1. Apply a monoscope pattern.
2. Adjust **Dd, Horizontal Width** until distance **A = B** (4.50 ± 0.40 aprox.) See Fig. 30.
3. Adjust **Vertical Size** to obtain a complete round pattern.

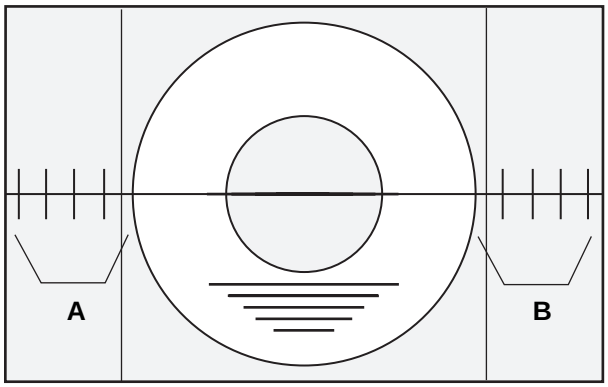


Figure 30. **Horizontal Size Adjustment**

Vertical Position, Vertical Size

Serviceman DAC Adjustment (D6, D1)

Preparation:

1. Apply a monoscope pattern.

Procedure:

1. Adjust **D7 Vertical Position** until picture is centered with the vertical center of the CRT. Use **D6** for fine adjustment.
2. Adjust **D1, for Vertical Size** to obtain a round monoscope pattern; distance **C = D.** See Fig. 31.

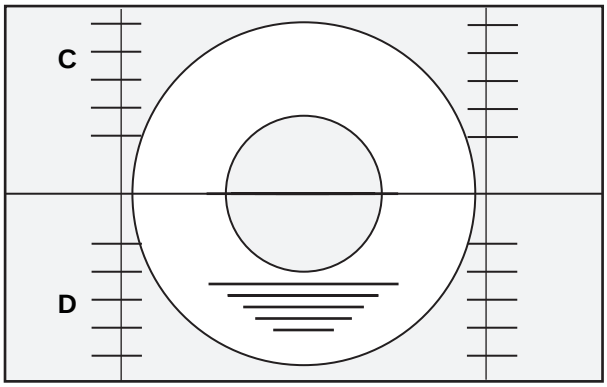


Figure 31. Vertical size adjustment

Service Adjustments (Electronic Controls, cont.)

Vertical Linearity adjustment

Serviceman DAC Adjustment (D3)

Preparation:

1. Apply a crosshatch pattern.

Procedure:

1. Adjust **D3 Vertical linearity** so that distance **A = B**. See Fig. 32.

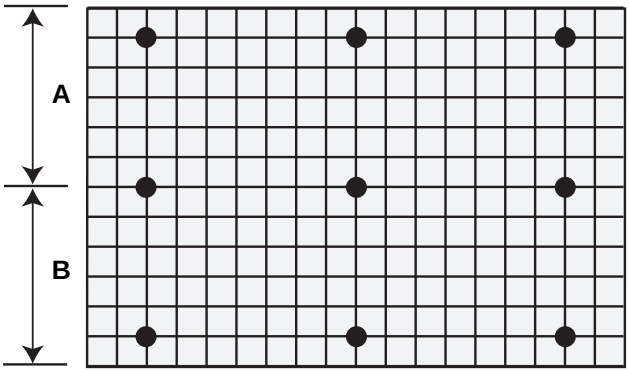


Figure 32. **Vertical Linearity**

To make a correlation of the Vertical Size from monoscope pattern, after Adjust **HORIZONTAL CENTER, HORIZONTAL WIDTH, VERTICAL POSITION AND SIZE** to obtain a complete round picture, mark the points as shown in Fig. 33 and use them as a reference in Linearity adjustment.

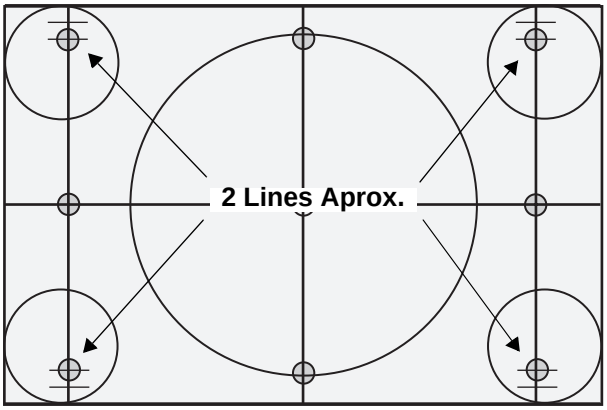


Figure 33. **Points for Correlation**.

Vertical Correction Adjustment

Serviceman DAC Adjustment (D2)

Preparation:

1. Apply a crosshatch pattern.
2. Adjust V-Size (**D1**) to obtain a regular size. (Confirm with monoscope pattern a complete round picture)

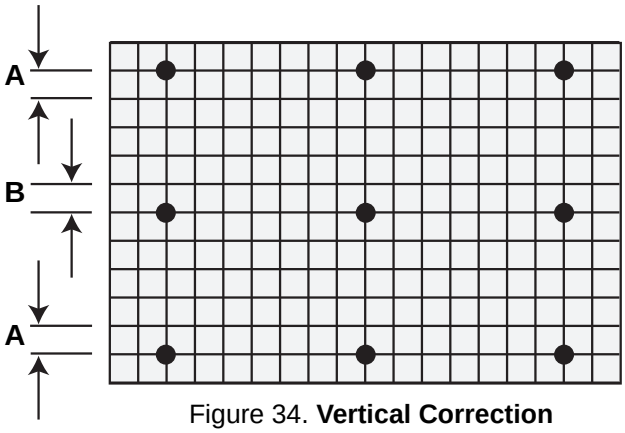


Figure 34. **Vertical Correction**

Procedure:

1. If **B-A < -1.5mm**. See Fig. 34.

- Increase the value in D2 V-S Correction one step.
- Adjust **D1 V-Size** to keep picture proportions (Confirm with monoscope pattern a complete round picture).
- Repeat above steps until **B-A ≤ 1.5mm.**

2. If **B-A > -1.5mm.** See Fig. 34.

- Decrease **D2** value one step.
- Adjust **D1 V-Size** to keep picture proportions (Confirm with monoscope pattern a complete round picture).
- Repeat above steps until **B-A ≤ 1.5mm**.

MTS Circuit Confirmation

Audio levels (MTS Circuit) are factory preset, confirm output levels. If are not within the range, replace the Tuner, refer to parts list in this manual for part number.

Output Level Confirmation

Preparation:

1. Connect an RMS meter with filter jig as shown in Fig. 35.

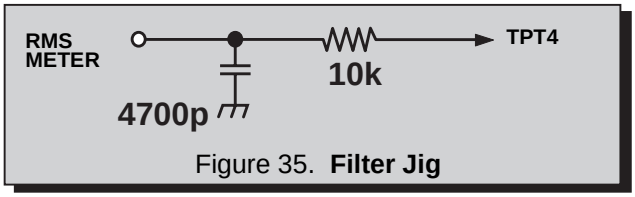


Figure 35. **Filter Jig**

2. Connect an RF signal generator to the RF antenna input.

Service Adjustments (Electronic Controls, cont.)

Procedure:

1. Apply the following signal from the RF signal generator:
   Video: 100 IRE flat field, 30% modulation.
   Audio: 300Hz, 100% modulation, monaural (70 ±5dB, 75Ω OPEN, P/S 10dB). Make sure that the 75μs pre-emphasis is OFF.
2. Confirm MTS Output level on TPT4 on the RMS is **530 ± 20.0mV rms**.

Stereo Separation Confirmation

Preparation:

1. Connect an RF signal generator to the RF antenna input.
2. Connect the scope to TPT3 for Right output.
3. Connect the scope to TPT4 for Left output

Procedure:

1. Select Stereo Mode in Audio menu
2. Apply the following signal from the RF signal generator:
   Video: 100 IRE flat field, 30% modulation.
   Audio: 300Hz, 30% modulation, stereo (left only) (70 ±5dB, 75Ω OPEN, P/S 10dB).
3. Confirm MTS stereo separation between Left and Right is minimum 20db.
4. Apply the following signal from the RF signal generator:
   Video: 100 IRE flat field, 30% modulation.
   Audio: 3KHz, 30% modulation, stereo (left only) (70 ±5dB, 75Ω OPEN, P/S 10dB).
5. Confirm MTS stereo separation between Left and Right is minimum 20db.

Audio Signal Path Block Diagram

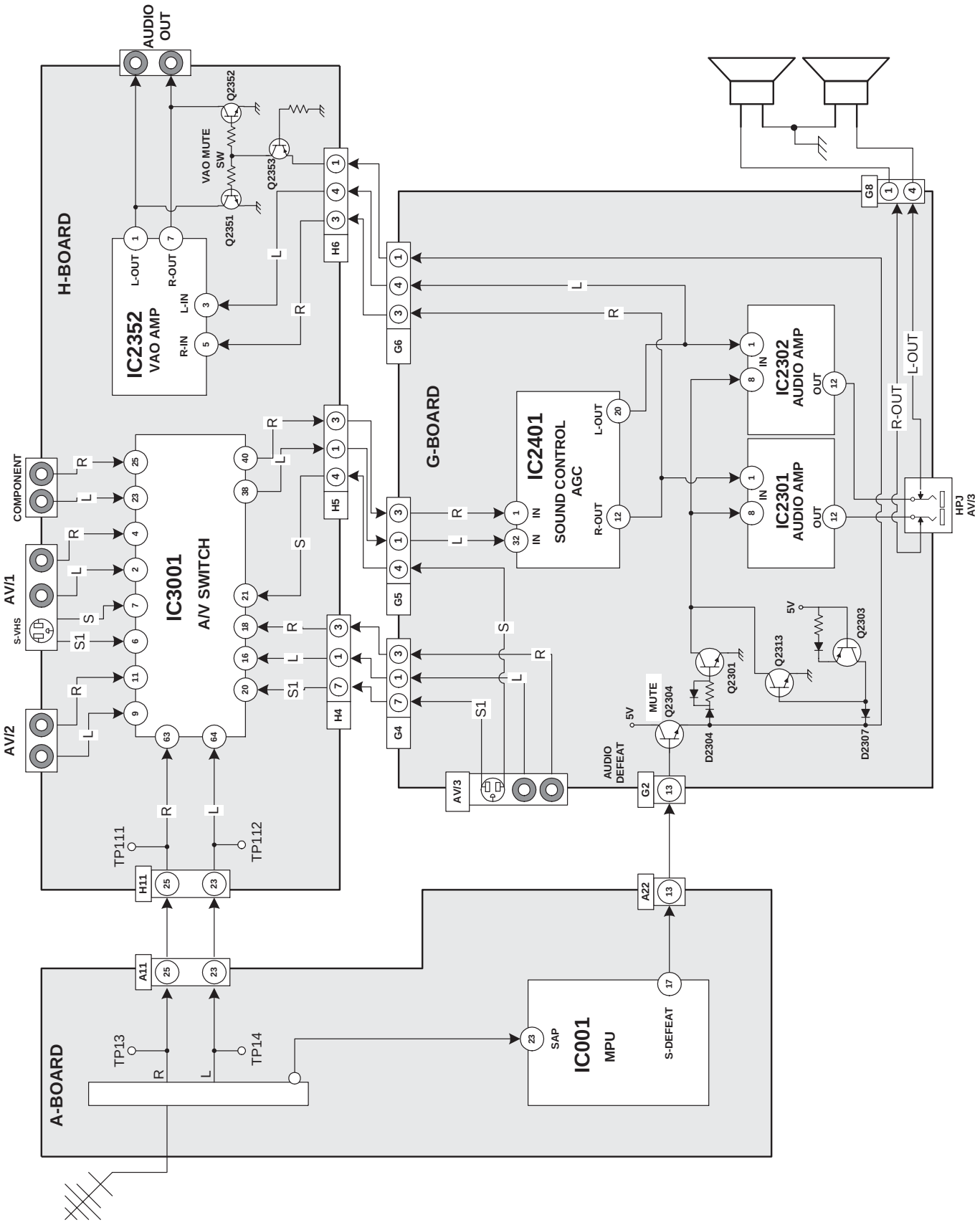


Figure 36. Audio Signal Path Block Diagram.

Video-Chroma Signal Path Block Diagram

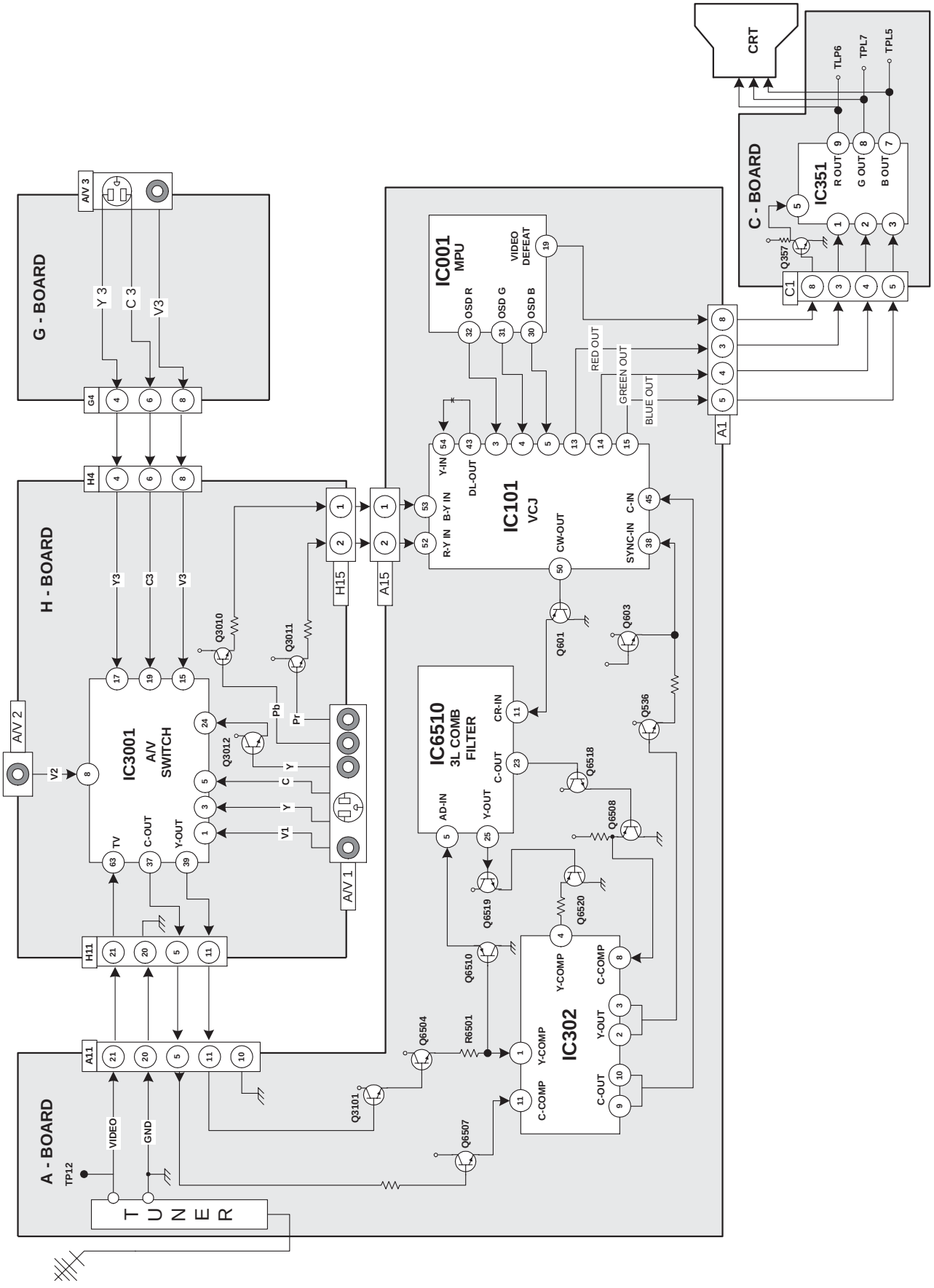


Figure 37. Video-Chroma Signal Path Block Diagram.

IC001 MPU
IN/OUT Pins and Functions

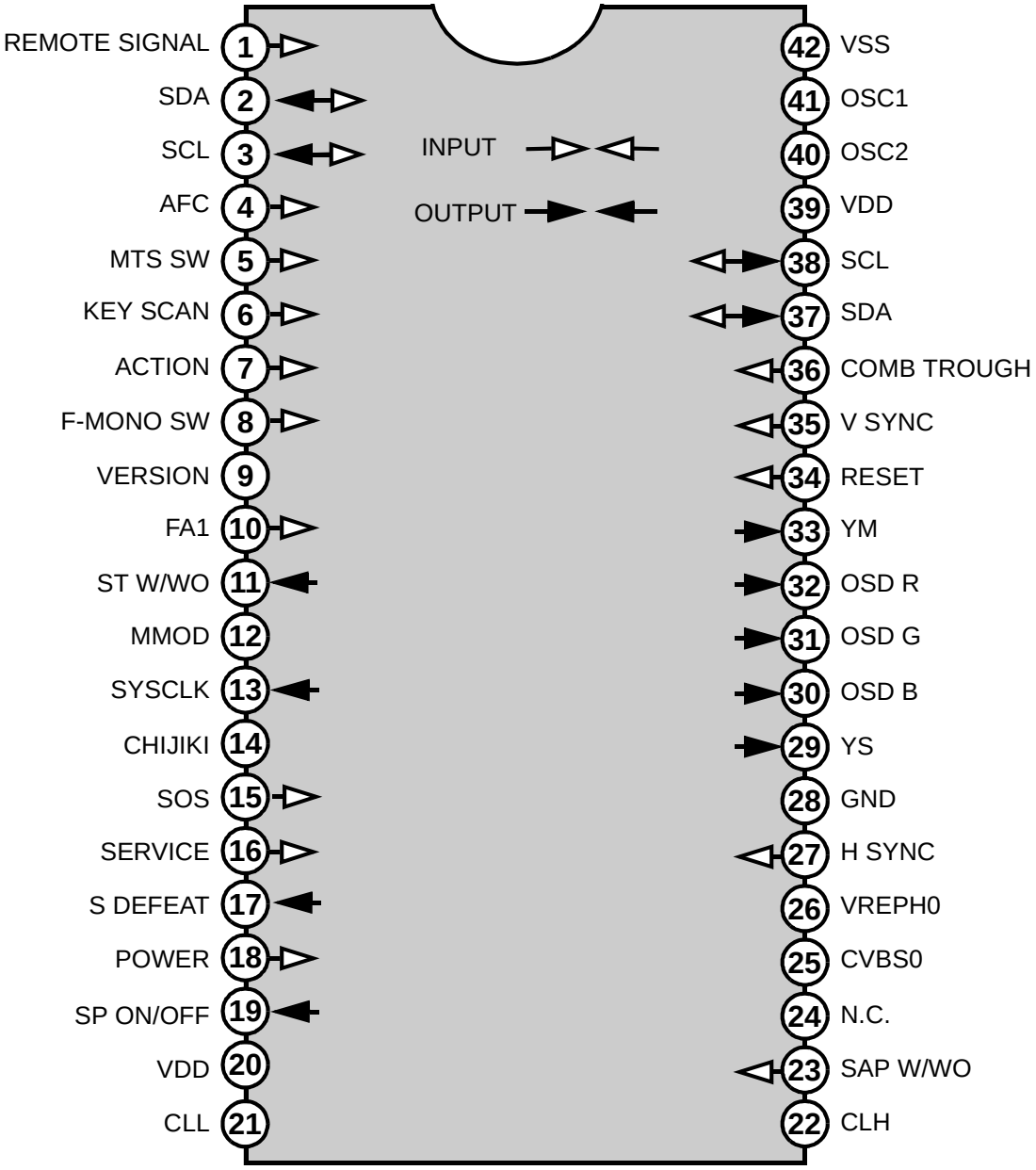


Figure 38. MPU IN/OUT Pins and Functions.

IC101 VCJ
IN/OUT Pins and Functions

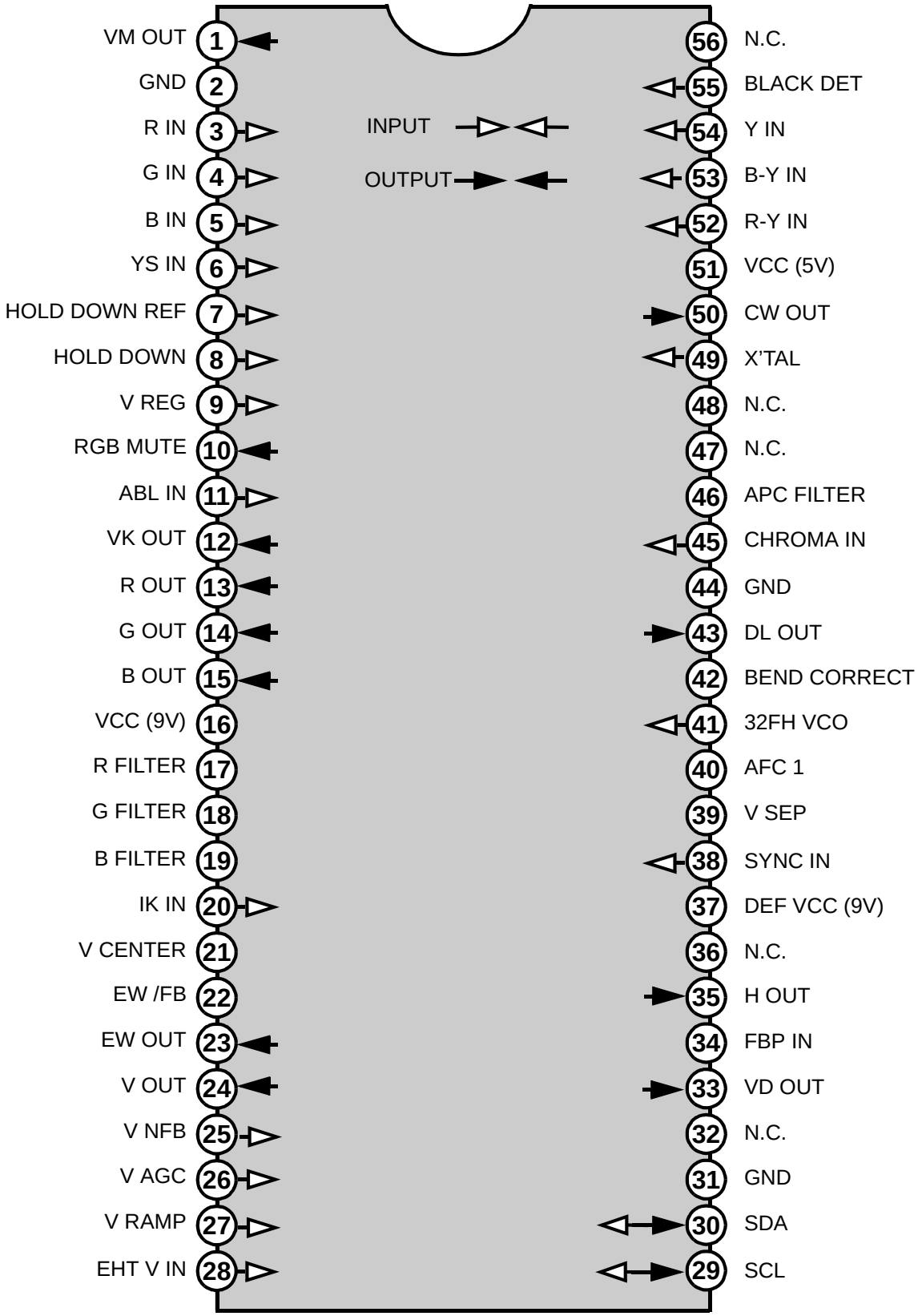


Figure 39. VCJ IN/OUT Pins and Functions.

REPLACEMENT PARTS LIST

Models: CT-20SX10B, CT-20SX10CB, CT-24SX10B, CT-24SX10CB CT-F2110XB & CT-F2510XB

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF NO.	PART NO.	DESCRIPTION
	CAPACITORS	
C002	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C006	ECA1HM100B	CAP,E 10UF/50V
C016	ECA1HM010B	CAP,E 1UF-50V
C018	ECJ2VC1H101J	CAP,C 100PF-J-50V
C019	ECJ2VC1H220J	CAP,C 22PF-J-50V
C020	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C022	ECJ2VC1H220J	CAP,C 22PF-J-50V
C026	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C030	ECA0JM102B	CAP,E 1000UF-6.3V
C033	ECJ2VF1H104Z	CAP,C .1UF-Z-50V
C034	ECA1CM101B	CAP,E 100UF/16V
C036	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C038	ECA0JM102B	CAP,E 1000UF-6.3V
C040	ECA1HM4R7B	CAP,E 4.7UF-50V
C041	ECA1HMR22B	CAP,E .22UF-50V
C042	ECA1HM2R2B	CAP,E 2.2UF-50V
C043	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C044	ECKR1H103ZF5	CAP,C .01UF-Z-50V
C045	ECA1VM470B	CAP,E 47UF/35V
C046	ECA1CM470B	CAP,E 47UF/16V
C047	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C048	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C049	ECA1CM101B	CAP,E 100UF/16V
C050	ECA1CM101B	CAP,E 100UF/16V
C301	ECQB1H104JM3	CAP,P .1UF-J-50V
C302	ECQB1H104JM3	CAP,P .1UF-J-50V
C303	ECQB1H104JM3	CAP,P .1UF-J-50V
C310	ECJ2VC1H390J	CAP,C 39PF-J-50V
C315	EEANA1E1R0B	CAP,E 1.0UF-25V
C351	TACCV470T50V	CAP,C 47PF/50V
C353	TACCV330T50V	CAP,C 33PF/50V
C358	TACCW101T50V	CAP,C 100PF/50V
C359	ECQM4104KZB	CAP,P .10UF-K-400V
C368	ECQV1H224JZ3	CAP,P .22UF-J-50V
C370	ECKW3D102KBN	CAP,C .001UF-K-2KVDC
C371	ECEA1HN010UB	CAP,E 1UF/50V
C373	ECA2EHG100B	CAP,E 10UF-25V
C377	ECA1CM221B	CAP,E 220UF-16V
C401	ECQB1H104JM3	CAP,P .1UF-J-50V
C402	ECJ2VB1C104K	CAP,C .1UF-K-16V
C403	ECA1HM010B	CAP,E 1UF-50V
C404	ECSF1EE105VB	CAP,E 1.0UF-25V
C405	ECA1HM220B	CAP,E 22UF-50V
C407	ECJ2VB1H102K	CAP,C .001UF-K-50V
C453	EEUNA1E220B	CAP,E 22UF-25V
C454	ECA1HHG221B	CAP,E 220UF-50V
C456	ECQB1104JF3	CAP,P .10UF-J-100V
C458	ECKR1H221KB5	CAP,C 220PF-K-50V

REF NO.	PART NO.	DESCRIPTION
C459	ECQB1224KF3	CAP,P .22UF-K-100V
C460	ECA1VM221B	CAP,E 220UF-35V
C461	ECA1VM470B	CAP,E 47UF/35V
C462	ECA1VM221B	CAP,E 220UF-35V
C463	ECQB1H103JM3	CAP,P .01UF-J-50V
C465	ECA1CM101B	CAP,E 100UF/16V
C470	ECQB1H104JM3	CAP,P .1UF-J-50V
C471	ECQB1H104JM3	CAP,P .1UF-J-50V
C491	ECKR2H471KB5	CAP,C 470PF-K-500W
C493	ECKR2H471KB5	CAP,C 470PF-K-500W
C495	ECQB1H683JM3	CAP,P .068UF-J-50V
C497	ECA1EM102B	CAP,E 1000UF-25V
C498	ECA1EM102B	CAP,E 1000UF-25V
C511	ECKR2H271KB5	CAP,C 270PF-K-500W
C535	ECJ2VC1H120J	CAP,C 12PF-J-50V
C550	ECA160V33UE	CAP,E 33UF/160V
C551	**ECWH12H103JS**	**CAP,P .01UF-J-1.2KV** ***CT-24SX10B CT-24SX10CB CT-F2510XB***
C551	**ECWH20562JVB**	**CAP,P 5600PF-J-2KV** ***CT-20SX10B CT-20SX10CB CT-F2110XB***
C552	**ECQM4273JZW**	**CAP,P .027UF-J-400V** ***CT-20SX10B CT-20SX10CB CT-F2110XB***
C552	**ECQM4473JZW**	**CAP,P .047UF-J-400V** ***CT-24SX10B CT-24SX10CB CT-F2510XB***
C553	**ECWF2364JBB**	**CAP,P .36UF-J-200V** ***CT-20SX10B CT-20SX10CB CT-F2110XB***
C553	**ECWF2684JSR**	**CAP,P .26UF-J-200V** ***CT-24SX10B CT-24SX10CB CT-F2510XB***
C554	**ECKW3D102KBR**	**CAP,C 1000PF-K-2KV**
C555	ECA160V33UE	CAP,E 33UF/160V
C556	**ECWH20122JVY**	**CAP,P 1200PF-J-2KV** ***CT-24SX10B CT-24SX10CB CT-F2510XB***
C556	**ECWH20562JVY**	**CAP,P 5600PF-J-2KV** ***CT-20SX10B CT-20SX10CB CT-F2110XB***
C557	ECA1HM100B	CAP,E 10UF/50V
C558	**ECKW3D561KBR**	**CAP,C 560PF-K-2KV** ***CT-24SX10B CT-24SX10CB CT-F2510XB***
C558	**ECKW3D681KBR**	**CAP,C 680PF-K-2KV** ***CT-20SX10B CT-20SX10CB CT-F2110XB***
C559	ECKW3D681KBP	CAP,C 680PF-K-2KV
C561	ECQB1H273JM3	CAP,P .27UF-J-50V
C562	**ECKW3D102JBR**	**CAP,C 1000PF-J-2KV** ***CT-24SX10B CT-24SX10CB CT-F2510XB***

REPLACEMENT PARTS LIST

Models: CT-20SX10B, CT-20SX10CB, CT-24SX10B, CT-24SX10CB CT-F2110XB & CT-F2510XB

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF NO.	PART NO.	DESCRIPTION
C563	**ECWH16332JVY**	**CAP,P 3300PF-J-1.5KV** ***CT-24SX10B CT-24SX10CB CT-F2510XB***
C569	**ECWF2394JBB**	**CAP,P .39UF-J-200V** ***CT-24SX10B CT-24SX10CB CT-F2510XB***
C570	ECA2EM220B	CAP,E 22UF-250V
C571	ECKR2H102KB5	CAP,C 1000PF-K-500V
C572	**ECWF2334JBB**	**CAP,P .33UF-J-200V** ***CT-24SX10B CT-24SX10CB CT-F2510XB***
C573	ECQE2105KFB	CAP,P 1.0UF-K-200V *CT-20SX10B CT-20SX10CB CT-F2110XB*
C573	ECQE2474KFW	CAP,P .47UF-K-200V *CT-24SX10B CT-24SX10CB CT-F2510XB*
C580	ECA1HM4R7B	CAP,E 4.7UF-50V
C593	ECEA1HNR47UB	CAP,E .47UF-50V
C594	ECQB1H104JM3	CAP,P .1UF-J-50V
C595	ECEA1EN100UB	CAP,E 10UF-25V
C601	ECA1CM471B	CAP,E 470UF-16V
C602	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C603	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C604	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C605	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C606	ECQB1H104JM3	CAP,P .1UF-J-50V
C607	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C614	ECQB1H104JM3	CAP,P .1UF-J-50V
C615	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C616	ECQB1H104JM3	CAP,P .1UF-J-50V
C617	ECQB1H222JM3	CAP,P 2200PF-J-50V
C618	ECA1HM010B	CAP,E 1UF-50V
C619	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C620	ECQB1H223JM3	CAP,P .022UF-J-50V
C621	ECA1HMR22B	CAP,E .22UF-50V
C623	ECA1HM010B	CAP,E 1UF-50V
C624	ECJ2VC1H180J	CAP,C 18PF-J-50V
C625	ECA1HM2R2B	CAP,E 2.2UF-50V
C626	ECQB1H273JM3	CAP,P .27UF-J-50V
C627	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C628	ECJ2VC1H151J	CAP,C 150PF-J-50V
C629	ECA1CM221B	CAP,E 220UF-16V
C630	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C631	ECA1CM221B	CAP,E 220UF-16V
C632	ECJ2VB1H103J	CAP,C .10UF-J-50V
C633	ECA1CM101B	CAP,E 100UF/16V
C634	ECA1HM100B	CAP,E 10UF/50V
C640	ECQB1H104JM3	CAP,P .1UF-J-50V
C641	ECA1HM100B	CAP,E 10UF/50V
C642	ECJ2VF1H103Z	CAP,C .01UF-Z-50V

REF NO.	PART NO.	DESCRIPTION
C701	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C741	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C750	TACCW181T50V	CAP,C 180PF/50V
C751	ECQE1335KFB	CAP,P 3.3UF-K-100V *CT-20SX10B CT-20SX10CB CT-F2110XB*
C751	ECQE1685KFB	CAP,P 6.8UF-K-100V *CT-24SX10B CT-24SX10CB CT-F2510XB*
C752	ECA1VM470B	CAP,E 47UF/35V
C753	ECQB1H222JM3	CAP,P .22UF-J-50V
C754	TACCW332T50V	CAP,C .0033UF/50V
C755	ECQB1H273JM3	CAP,P .27UF-J-50V *CT-24SX10B CT-24SX10CB CT-F2510XB*
C755	TACCW472T50V	CAP,C .0047UF/50V *CT-20SX10B CT-20SX10CB CT-F2110XB*
C756	ECKR2H332KB5	CAP,C 3300PF-K-550V
C757	ECQB1H682JM3	CAP,P 6800PF-J-50V *CT-24SX10B CT-24SX10CB CT-F2510XB*
C763	ECKR3A121KBP	CAP,C 120PF-K-1KV
C801	**ECQU2A474MVA**	**CAP,P .47UF-M-250V**
C802	**ECQU2A473MNB**	**CAP,P .047UF-M-250V**
C804	**ECQU2A473MNB**	**CAP,P .047UF-M-250V**
C805	**ECKW2H472PU7**	**CAP,C 4700PF-P-500V**
C806	**ECKW2H472PU7**	**CAP,C 4700PF-P-500V**
C807	**ECKW2H472PU7**	**CAP,C 4700PF-P-500V**
C810	**EC0S2DA561BB**	**CAP,E 560PF-200V**
C814	ECA1VHG101B	CAP,E 100UF-35V
C819	ECKR3D222KBP	CAP,C 2200PF-K-2KVDC
C821	TACCW471T50V	CAP,C 470PF/50V
C823	ECA1CHG101B	CAP,E 100UF-16V
C824	**ECKCNB222ME**	**CAP,C .0022UF-M-250V**
C825	ECQB1H272JM3	CAP,P 2700PF-J-50V
C827	**ECKCNB222ME**	**CAP,C .0022UF-M-250V**
C828	ECA1EM471B	CAP,E 470UF-25V
C830	ECKR2H471KB5	CAP,C 470PF-K-500W
C835	ECQB1H103JM3	CAP,P .01UF-J-50V
C837	ECA1CHG332E	CAP,E 3300UF-16V
C849	EC0S2DA221BB	CAP,E 220UF/200V
C850	ECKR3A471KBP	CAP,C 470PF-K-1KV
C851	ECA1CM471B	CAP,E 470UF-16V
C860	ECA1CHG221B	CAP,E 220UF/16V
C879	ECA1HM010B	CAP,E 1UF-50V
C881	ECA1EMH101B	CAP,E 100UF-25V
C882	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C883	ECA1CHG221B	CAP,E 220UF/16V
C888	ECA1CHG471B	CAP,E 470UF-16V
C889	ECJ2VF1H103Z	CAP,C .01UF-Z-50V

REPLACEMENT PARTS LIST

Models: CT-20SX10B, CT-20SX10CB, CT-24SX10B, CT-24SX10CB
CT-F2110XB & CT-F2510XB

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF NO.	PART NO.	DESCRIPTION
C891	ECA1HHG100B	CAP,E 10UF/50V
C904	ECKR1H103ZF5	CAP,C .01UF-Z-50V
C911	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C912	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C913	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C914	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C915	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C916	ECA1CM101B	CAP,E 100UF/16V
C917	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C921	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C923	ECJ2VC1H680J	CAP,C 68PF-J-50V
C952	ECA1HM100B	CAP,E 10UF/50V
C953	ECKR1H103ZF5	CAP,C .01UF-Z-50V
C958	ECA2CM470B	CAP,E 47UF-160V
C959	ECKW2H103ZF7	CAP,C .01UF-Z-500V
C960	ECCR2H151J5	CAP,C 150-500V
C961	ECA2AM100B	CAP,E 10UF-100V
C962	ECKW2H103ZF7	CAP,C .01UF-Z-500V
C963	ECCR1H151J5	CAP DISC 150-5-50V
C964	ECA1CHG101B	CAP,E 100UF-16V
C966	ECA1CHG101B	CAP,E 100UF-16V
C967	ECA1CM221B	CAP,E 220UF-16V
C968	ECKR1H103ZF5	CAP,C .01UF-Z-50V
C969	ECKR1H103ZF5	CAP,C .01UF-Z-50V
C971	TACCW222T50V	CAP,C 2200PF/50V
C1051	TACCX103T50V	CAP,C .01UF/50V
C1052	ECA0JM102B	CAP,E 1000UF-6.3V
C1056	ECA1CM470B	CAP,E 47UF/16V
C1057	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C2301	ECA1HHG100B	CAP,E 10UF/50V
C2302	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C2303	ECA1EHG101B	CAP,E 100UF-25V
C2304	ECA1HM100B	CAP,E 10UF/50V
C2305	ECA1EHG222E	CAP,E 2200UF/25V
C2306	ECA1EHG471B	CAP,E 470UF-25V
C2307	ECJ2VF1H683Z	CAP,C .068UF-Z-50V
C2309	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C2310	ECA1CM101B	CAP,E 100UF/16V
C2311	ECA1HHG100B	CAP,E 10UF/50V
C2312	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C2313	ECA1EHG101B	CAP,E 100UF-25V
C2314	ECA1HM100B	CAP,E 10UF/50V
C2315	ECA1EHG222E	CAP,E 2200UF/25V
C2316	ECA1EHG471B	CAP,E 470UF-25V
C2317	ECJ2VF1H683Z	CAP,C .068UF-Z-50V
C2319	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C2320	ECA1CM470B	CAP,E 47UF/16V
C2322	ECA1VM101B	CAP,E 100UF-35V
C2342	ECJ2VB1H102K	CAP,C .001UF-K-50V

REF NO.	PART NO.	DESCRIPTION
C2343	ECJ2VB1H102K	CAP,C .001UF-K-50V
C2347	ECA1HM470B	CAP,E 47UF-50V
C2348	ECA1HM470B	CAP,E 47UF-50V
C2349	ECA1VHG470B	CAP,E 47UF-35V
C2350	ECA1VHG470B	CAP,E 47UF-35V
C2376	ECA1HM010B	CAP,E 1UF-50V
C2377	ECA1HM010B	CAP,E 1UF-50V
C2378	ECA1HM100B	CAP,E 10UF/50V
C2379	ECA1HM100B	CAP,E 10UF/50V
C2380	ECA1HM010B	CAP,E 1UF-50V
C2381	ECA1HM010B	CAP,E 1UF-50V
C2402	ECJ2VB1H393K	CAP,C .039UF-K-50V
C2404	ECJ2VB1H223K	CAP,C .022UF-K-50V
C2405	ECA1HM010B	CAP,E 1UF-50V
C2412	ECJ2VB1H562K	CAP,C .0056UF-K-50V
C2413	ECA1HM010B	CAP,E 1UF-50V
C2420	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C2421	ECA1CM102B	CAP,E 1000UF/16V
C2424	EEANA1E1R0B	CAP,E 1.0UF-25V
C2425	EEANA1E1R0B	CAP,E 1.0UF-25V
C2427	ECA1HM100B	CAP,E 10UF/50V
C2428	ECA1HM4R7B	CAP,E 4.7UF-50V
C2429	ECA1HM4R7B	CAP,E 4.7UF-50V
C2430	ECA1HM4R7B	CAP,E 4.7UF-50V
C2431	ECA1CM471B	CAP,E 470UF-16V
C2432	ECJ2VB1E104K	CAP,C .10UF-K-25V
C2433	ECQB1H683JM3	CAP,P .068UF-J-50V
C2434	ECA1HM4R7B	CAP,E 4.7UF-50V
C2435	ECA1HM010B	CAP,E 1UF-50V
C2436	ECQB1H683JM3	CAP,P .068UF-J-50V
C2437	ECJ2VC1H102J	CAP,C .001UF-J-50V
C2439	ECJ2VC1H102J	CAP,C .001UF-J-50V
C2441	ECA1HM010B	CAP,E 1UF-50V
C2442	ECA1HM010B	CAP,E 1UF-50V
C2449	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C2801	ECKR3A471KBP	CAP,C 470PF-K-1KV
C2802	ECA1VHG102B	CAP,E 1000UF-35V
C3006	ECEA1HKA010B	CAP,E 1.0UF-50V
C3007	ECJ2VF1C105Z	CAP,C 1.0UF-Z-16V
C3008	ECEA1HKA010B	CAP,E 1.0UF-50V
C3013	ECEA1HKA010B	CAP,E 1.0UF-50V
C3015	ECEA1HKA010B	CAP,E 1.0UF-50V
C3016	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C3017	ECEA1HKA010B	CAP,E 1.0UF-50V
C3020	ECJ2VB1H102K	CAP,C .001UF-K-50V
C3021	ECEA1HKA010B	CAP,E 1.0UF-50V
C3022	ECEA1HKA010B	CAP,E 1.0UF-50V
C3023	ECEA1HKA010B	CAP,E 1.0UF-50V
C3024	ECJ2VB1H102K	CAP,C .001UF-K-50V

REPLACEMENT PARTS LIST

Models: CT-20SX10B, CT-20SX10CB, CT-24SX10B, CT-24SX10CB
CT-F2110XB & CT-F2510XB

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF NO.	PART NO.	DESCRIPTION
C3025	ECJ2VB1H102K	CAP,C .001UF-K-50V
C3026	ECJ2VB1H102K	CAP,C .001UF-K-50V
C3029	ECJ2VB1H102K	CAP,C .001UF-K-50V
C3030	ECJ2VB1H102K	CAP,C .001UF-K-50V
C3031	ECJ2VB1H102K	CAP,C .001UF-K-50V
C3034	ECA1EM471B	CAP,E 470UF-25V
C3036	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C3039	ECEA1CKA470B	CAP,E 47UF-16V
C3041	ECJ2VB1H102K	CAP,C .001UF-K-50V
C3042	ECJ2VB1H102K	CAP,C .001UF-K-50V
C3043	ECJ2YB1A105K	CAP,C 1.0UF-K-125V
C3044	ECJ2VB1H102K	CAP,C .001UF-K-50V
C3046	ECJ2VB1H102K	CAP,C .001UF-K-50V
C3048	ECJ2VF1C105Z	CAP,C 1.0UF-Z-16V
C3049	ECJ2YB1A105K	CAP,C 1.0UF-K-125V
C3050	ECJ2VF1C105Z	CAP,C 1.0UF-Z-16V
C3056	ECJ2VF1C105Z	CAP,C 1.0UF-Z-16V
C3070	ECJ2YB1A105K	CAP,C 1.0UF-K-125V
C3071	ECJ2YB1A105K	CAP,C 1.0UF-K-125V
C3072	ECJ2YB1A105K	CAP,C 1.0UF-K-125V
C3073	ECA1VM470B	CAP,E 47UF/35V
C3083	ECJ2YB1A105K	CAP,C 1.0UF-K-125V
C3084	ECJ2YB1A105K	CAP,C 1.0UF-K-125V
C3094	ECEA1HKA010B	CAP,E 1.0UF-50V
C3095	ECEA1HKA010B	CAP,E 1.0UF-50V
C3096	ECEA1HKA010B	CAP,E 1.0UF-50V
C3224	ECA1VM470B	CAP,E 47UF/35V
C3225	ECA1VM470B	CAP,E 47UF/35V
C3226	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C3227	ECJ2VF1C105Z	CAP,C 1.0UF-Z-16V
C6501	ECA1HM0R1B	CAP,E 0.1UF/50V
C6502	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C6503	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C6504	ECA1HM0R1B	CAP,E 0.1UF/50V
C6505	ECA1HM100B	CAP,E 10UF/50V
C6506	ECJ2VC1H050C	CAP,C 5PF-C-50V
C6510	ECJ2VC1H390J	CAP,C 39PF-J-50V
C6513	ECJ2VC1H050C	CAP,C 5PF-C-50V
C6514	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C6515	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C6518	ECJ2VC1H270J	CAP,C 27PF-J-50V
C6520	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C6522	ECA0JM331B	CAP,E 330UF-6.3V
C6523	ECA1CM101B	CAP,E 100UF/16V
C6524	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C6525	ECJ2VC1H470J	CAP,C 47PF-J-50V
C6526	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C6527	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C6528	ECJ2VC1H181J	CAP,C 180PF-J-50V
C6529	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C6530	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C6531	ECA1HM100B	CAP,E 10UF/50V
C6532	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C6533	ECJ2VB1H472K	CAP,C .0047UF-K-50V
C6534	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C6535	ECEA1HNR47UB	CAP,E .47UF-50V
C6536	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C6537	ECA1HM100B	CAP,E 10UF/50V
C6538	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C6539	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C6540	ECJ2VC1H101J	CAP,C 100PF-J-50V
C6541	ECJ2VC1H270J	CAP,C 27PF-J-50V
	DIODES	
D001	MA4039MTA	DIODE, ZENER
D002	MA4039MTA	DIODE, ZENER
D005	MA165TA5VT	DIODE, SWITCHING
D014	MA165TA5VT	DIODE, SWITCHING
D015	MA165TA5VT	DIODE, SWITCHING
D022	MA4300MTA	DIODE
D354	MA165TA5VT	DIODE, SWITCHING
D355	MA165TA5VT	DIODE, SWITCHING
D356	MA165TA5VT	DIODE, SWITCHING
D357	MA4150MTA	DIODE
D358	MA165TA5VT	DIODE, SWITCHING
D359	MA4150MTA	DIODE
D360	ERA22-04V3	DIODE, SILICONE
D361	ERA22-04V3	DIODE, SILICONE
D362	ERA22-04V3	DIODE, SILICONE
D375	MA165TA5VT	DIODE, SWITCHING
D451	ERA15-02V3	DIODE
D452	MA165TA5VT	DIODE, SWITCHING
D455	MA165TA5VT	DIODE, SWITCHING
D456	MA165TA5VT	DIODE, SWITCHING
D457	MA165TA5VT	DIODE, SWITCHING
D459	MA165TA5VT	DIODE, SWITCHING
D490	D1NL40V70	DIODE
D491	D1NL40V70	DIODE
D551	**ERD07-15E**	**DIODE**
D552	**RU3NLFA1**	**DIODE**
D553	**MA4062LTVTA**	**DIODE, ZENER**
D554	MA4270MTA	DIODE
D555	MA165TA5VT	DIODE, SWITCHING
D556	MA4360HTA	DIODE, ZENER
D570	D1NL40V70	DIODE
D580	D1NL40V70	DIODE
D596	MA165TA5VT	DIODE, SWITCHING
D601	MA4056HTA	DIODE
D740	MA165TA5VT	DIODE, SWITCHING

REPLACEMENT PARTS LIST

Models: CT-20SX10B, CT-20SX10CB, CT-24SX10B, CT-24SX10CB
CT-F2110XB & CT-F2510XB

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF NO.	PART NO.	DESCRIPTION
D741	MA165TA5VT	DIODE, SWITCHING
D742	MA165TA5VT	DIODE, SWITCHING
D743	MA165TA5VT	DIODE, SWITCHING
D753	AU01ZV0	DIODE
D801	**D3SB60**	**RECTFIER BRIDGE (INT CKT)**
D803	**TRPW5B0M050D**	**THERMISTOR**
D814	**TMPG10G3**	**DIODE**
D815	ERA18-02V3	DIODE
D816	ERA18-02V3	DIODE
D817	ERA18-02V3	DIODE
D818	ERA18-02V3	DIODE
D820	ERA15-01V3	DIODE, RECTIFIER
D821	ERA15-01V3	DIODE, RECTIFIER
D822	ERA15-01V3	DIODE, RECTIFIER
D823	ERA15-01V3	DIODE, RECTIFIER
D834	MA165TA5VT	DIODE, SWITCHING
D835	MA165TA5VT	DIODE, SWITCHING
D836	MA4180MTA	DIODE
D838	MA4039MTA	DIODE
D839	MA165TA5VT	DIODE, SWITCHING
D841	RN2ZLFA1	DIODE
D845	MA165TA5VT	DIODE, SWITCHING
D850	**RU30ALFS1**	**DIODE, RECTIFIER**
D858	AU02ZV0	DIODE
D1001	LN21RCPH	DIODE, LED
D2302	MA165TA5VT	DIODE, SWITCHING
D2303	MA165TA5VT	DIODE, SWITCHING
D2304	MA165TA5VT	DIODE, SWITCHING
D2306	MA165TA5VT	DIODE, SWITCHING
D2307	MA165TA5VT	DIODE, SWITCHING
D2801	ERB32-02E	DIODE
D3008	MA4150MTA	DIODE
D3009	MA4150MTA	DIODE
D3012	MA4150MTA	DIODE
D3015	MA4150MTA	DIODE
D3016	MA3110MTX	DIODE, ZENER
D3017	MA3110MTX	DIODE, ZENER
D3018	MA3110MTX	DIODE, ZENER
D3019	MA3110MTX	DIODE, ZENER
D3020	MA3110MTX	DIODE, ZENER
D3021	MA3110MTX	DIODE, ZENER
D3022	MA3110MTX	DIODE, ZENER
D3023	MA3110MTX	DIODE, ZENER
D3024	MA3110MTX	DIODE, ZENER
D3025	MA3110MTX	DIODE, ZENER
D3026	MA3110MTX	DIODE, ZENER
D3027	MA3110MTX	DIODE, ZENER
D3028	MA3110MTX	DIODE, ZENER

REF NO.	PART NO.	DESCRIPTION
D3029	MA3110MTX	DIODE, ZENER
D3030	MA3110MTX	DIODE, ZENER
D3031	MA3110MTX	DIODE, ZENER
D3032	MA3110MTX	DIODE, ZENER
D3033	MA3110MTX	DIODE, ZENER
D3044	MA3110MTX	DIODE, ZENER
D3210	MA3110MTX	DIODE, ZENER
D3211	MA3110MTX	DIODE, ZENER
D3213	MA3110MTX	DIODE, ZENER
D3214	MA3110MTX	DIODE, ZENER
D3215	MA3110MTX	DIODE, ZENER
D3216	MA3110MTX	DIODE, ZENER
D3217	MA3110MTX	DIODE, ZENER
D3218	MA3110MTX	DIODE, ZENER
FUSES		
F801	**XBA2A00101**	**FUSE, 125V-6.3A** ***CT-20SX10B CT-20SX10CB CT-24SX10B CT-24SX10CB***
F801	**XBA2C63TR0**	**FUSE, 250V-6.3A** ***CT-F2110XBM CT-F2510XBM***
INTEGRATED CIRCUITS		
IC001	MN101C46FTC1	INT CKT
IC004	PQ1R33	INT CKT
IC005	PQ05RD1B	INT CKT
IC006	PST9128NR	INT CKT
IC101	**TA1310BN**	**INT CKT**
IC302	TC4066BFN	INT CKT
IC351	TDA6103Q-N3	INT CKT
IC451	LA78045	INT CKT
IC740	NJM2904MTE1	INT CKT
IC750	NJM4565L	INT CKT
IC801	**STRF6548NF53**	**INT CKT**
IC802	**SE115NLF4**	**INT CKT** ***CT-20SX10B CT-20SX10CB CT-F2110XB***
IC802	**SE139NLF4**	**ERROR AMP** ***CT-24SX10B CT-24SX10CB CT-F2510XB***
IC811	**PC817B**	**INT CKT**
IC821	PQ12RD1B	INT CKT
IC882	AN78M05LB	PLUS 5V AVR
IC891	PQ09RD1B	INT CKT
IC2301	LA4289N	INT CKT
IC2302	LA4289N	INT CKT
IC2352	BA15218N	INT CKT
IC2401	BH3865S	INT CKT
IC3001	CXA2079Q	INT CKT
IC6501	TC90A53N	INT CKT
IC6502	AN78N05LB	INT CKT
RM001	PNA4701M03TV	INT CKT

REPLACEMENT PARTS LIST

Models: CT-20SX10B, CT-20SX10CB, CT-24SX10B, CT-24SX10CB CT-F2110XB & CT-F2510XB

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF NO.	PART NO.	DESCRIPTION
	COILS	
L001	EXCELSA35V	FERRITE BEAD
L005	ELESN330JA	COIL, PEAKING 33UH
L006	TLUABTA100K	COIL, PEAKING 10UH
L007	TLUABTA100K	COIL, PEAKING 10UH
L008	EXCELDR25V	FERRITE BEAD
L009	EXCELSA35V	FERRITE BEAD
L012	TLUABTA100K	COIL, PEAKING 10UH
L013	TLUABTA100K	COIL, PEAKING 10UH
L014	ELESN330JA	COIL, PEAKING 33UH
L301	ELESN470JA	COIL, PEAKING 47UH
L302	ELESN120JA	COIL, PEAKING 12UH
L303	EXCELDR35V	FERRITE BEAD
L551	**ELH5L4122**	**COIL** ***CT-20SX10B CT-20SX10CB CT-F2110XB***
L551	**TLHE040**	**COIL** ***CT-24SX10B CT-24SX10CB CT-F2510XB***
L553	EXCELSA39V	FERRITE BEAD
L556	ELC18B801E	COIL *CT-24SX10B CT-24SX10CB CT-F2510XB*
L559	TLUADNB682K	COIL
L601	TLUABTA560K	COIL, PEAKING 56UH
L706	EXCELSA35T	FERRITE BEAD
L751	ELC18B501E	COIL *CT-20SX10B CT-20SX10CB CT-F2110XB*
L751	ELC18B801E	COIL *CT-24SX10B CT-24SX10CB CT-F2510XB*
L752	TALL13N103JB	COIL
L801	**ELF21N024A**	**COIL**
L802	**ELF21N024A**	**COIL**
L805	EXCELSA35B	FERRITE BEAD
L818	EXCELSA35B	FERRITE BEAD
L822	EXCELSA35B	FERRITE BEAD
L850	EXCELSA39E	FERRITE BEAD
L851	EXCELSA39E	FERRITE BEAD
L852	TALL08T101KA	LINE FILTER
L951	EXCELSA24T	FERRITE BEAD
L953	EXCELSA24T	FERRITE BEAD
L954	EXCELSA24T	FERRITE BEAD
L955	EXCELSA24T	FERRITE BEAD
L2401	ELESN101JA	COIL, PEAKING 100UH
L2801	EXCELDR35V	FERRITE BEAD
L2804	EXCELDR35V	FERRITE BEAD
L6501	ELESN270JA	COIL, 27UH
L6504	ELESN101JA	COIL, PEAKING 100UH
L6505	ELESN330JA	COIL, PEAKING 33UH
L6507	ELESN101JA	COIL, PEAKING 100UH
L6512	ELESN101JA	COIL, PEAKING 100UH
L6513	ELESN101JA	COIL, PEAKING 100UH
L6514	ELESN330JA	COIL, PEAKING 33UH
L6520	ELESN150JA	COIL, PEAKING 15UH
	TRANSISTORS	
Q007	2SD601ATX	TRANSISTOR
Q008	2SD601ARTX	TRANSISTOR
Q009	2SD601ARTX	TRANSISTOR
Q301	2SD601ATX	TRANSISTOR
Q302	2SD601ATX	TRANSISTOR
Q303	2SD601ARTX	TRANSISTOR
Q357	2SC3311ATA	TRANSISTOR
Q369	2SA1309ATA	TRANSISTOR
Q401	2SD601ATX	TRANSISTOR
Q451	2SC3311ATA	TRANSISTOR
Q480	2SA1309ATA	TRANSISTOR
Q501	2SC3941HTA	TRANSISTOR
Q536	2SD601ATX	TRANSISTOR
Q551	2SD2553LB306	TRANSISTOR
Q601	2SB709ATX	TRANSISTOR
Q602	2SC3941HTA	TRANSISTOR
Q603	2SD601ATX	TRANSISTOR
Q701	2SD601ATX	TRANSISTOR
Q751	2SK2146LB	TRANSISTOR
Q754	2SC3311ATA	TRANSISTOR
Q755	2SA1309ATA	TRANSISTOR
Q817	2SD601ATX	TRANSISTOR
Q854	2SA19610QAHW	TRANSISTOR
Q901	2SB709ATX	TRANSISTOR
Q902	2SB709ATX	TRANSISTOR
Q903	2SD601ATX	TRANSISTOR
Q904	2SB709ATX	TRANSISTOR
Q905	2SB709ATX	TRANSISTOR
Q906	2SD601ATX	TRANSISTOR
Q907	2SB709ATX	TRANSISTOR
Q908	2SD601ATX	TRANSISTOR
Q951	2SC3311ATA	TRANSISTOR
Q952	2SC3311ATA	TRANSISTOR
Q953	2SC1741ASTP	TRANSISTOR
Q954	2SB1030ATA	TRANSISTOR
Q955	2SB1569AF51	TRANSISTOR
Q956	2SD2400AF51	TRANSISTOR
Q957	2SA1309ATA	TRANSISTOR
Q958	2SC3311ATA	TRANSISTOR
Q961	2SC3311ATA	TRANSISTOR
Q962	2SC3311ATA	TRANSISTOR
Q2301	2SD601ARTX	TRANSISTOR
Q2303	2SB709ARTX	TRANSISTOR
Q2304	2SD601ARTX	TRANSISTOR
Q2313	2SD601ARTX	TRANSISTOR

REPLACEMENT PARTS LIST

Models: CT-20SX10B, CT-20SX10CB, CT-24SX10B, CT-24SX10CB CT-F2110XB & CT-F2510XB

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF NO.	PART NO.	DESCRIPTION
Q2351	2SD601ARTX	TRANSISTOR
Q2352	2SD601ARTX	TRANSISTOR
Q2353	2SB709ARTX	TRANSISTOR
Q3010	2SD601ATX	TRANSISTOR
Q3011	2SD601TX	TRANSISTOR
Q3012	2SD601ATX	TRANSISTOR
Q3101	2SD601ATX	TRANSISTOR
Q6504	2SD601ATX	TRANSISTOR
Q6507	2SD601ATX	TRANSISTOR
Q6508	2SB709ATX	TRANSISTOR
Q6510	2SB709ATX	TRANSISTOR
Q6518	2SD601ATX	TRANSISTOR
Q6519	2SD601ATX	TRANSISTOR
Q6520	2SB709ATX	TRANSISTOR
	RELAYS	
RL801	**TSEH8007**	**RELAY**
	RESISTORS	
R005	ERJ6GEYJ472V	RES,M 4.7K-J-1/10W
R007	ERDS2TJ102T	RES,C 1K-J-1/4W
R008	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R009	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R010	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R013	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R014	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R015	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R016	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R017	ERDS2TJ103T	RES,C 10K-J-1/4W
R018	ERDS2TJ103T	RES,C 10K-J-1/4W
R019	ERDS2TJ103T	RES,C 10K-J-1/4W
R020	ERJ6GEYJ101V	RES,M 100-J-1/10W
R022	ERDS2TJ332T	RES,C 3.3K-J-1/4W
R023	ERJ6GEYJ332V	RES,M 3.3K-J-1/10W
R024	ERJ6GEYJ332V	RES,M 3.3K-J-1/10W
R026	ERJ6GEYJ332V	RES,M 3.3K-J-1/10W
R027	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R028	ERJ6GEYJ472V	RES,M 4.7K-J-1/10W
R029	ERJ6ENF1302V	RES,M 13K-F-1/10W
R031	ERJ6GEYJ472V	RES,M 4.7K-J-1/10W
R032	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R034	ERJ6GEYJ332V	RES,M 3.3K-J-1/10W
R035	ERJ6GEYJ332V	RES,M 3.3K-J-1/10W
R036	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R037	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R040	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R044	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R045	ERDS2TJ101T	RES,C 100-J-1/4W
R046	ERJ6GEYJ182V	RES,M 1.8K-J-1/10W
R048	ERJ6GEYJ562V	RES,M 5.6K-J-1/10W
R049	ERJ6GEYJ104V	RES,M 100K-J-1/10W

REF NO.	PART NO.	DESCRIPTION
R051	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R052	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R053	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R054	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R055	ERDS2TJ102T	RES,C 1K-J-1/4W
R056	ERJ6GEYJ472V	RES,M 4.7K-J-1/10W
R060	ERJ6GEYJ333V	RES,M 33K-J-1/10W
R061	ERJ6GEYJ682V	RES,M 6.8K-J-1/10W
R062	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R063	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R064	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R066	ERJ6GEYJ562V	RES,M 5.6K-J-1/10W
R069	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R070	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R075	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R077	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R099	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R301	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R303	ERJ6GEYJ332V	RES,M 3.3K-J-1/10W
R305	ERDS2TJ331T	RES,C 330-J-1/4W
R306	ERJ6GEYJ562V	RES,M 5.6K-J-1/10W
R308	ERJ6GEYJ273V	RES,M 27K-J-1/10W
R309	ERJ6GEYJ333V	RES,M 33K-J-1/10W
R310	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R351	ER0S2TKF9100	RES,M 910-F-1/4W
R352	ER0S2TKF9100	RES,M 910-F-1/4W
R353	ER0S2TKF9100	RES,M 910-F-1/4W
R354	ERDS2TJ621T	RES,C 620-J-1/4W
R355	ERDS2TJ621T	RES,C 620-J-1/4W
R356	ERDS2TJ621T	RES,C 620-J-1/4W
R357	ERDS2TJ102T	RES,C 1K-J-1/4W
R358	ERDS1TJ124T	RES,C 120K-J-1/2W *CT-24SX10B CT-24SX10CB CT-F2510XB*
R358	ERG1SJ104P	RES,M 100K-J-1W *CT-20SX10B CT-20SX10CB CT-F2110XB*
R359	ERDS1TJ124T	RES,C 120K-J-1/2W. *CT-24SX10B CT-24SX10CB CT-F2510XB*
R359	ERG1SJ104P	RES,M 100K-J-1W *CT-20SX10B CT-20SX10CB CT-F2110XB*
R360	ERDS1TJ124T	RES,C 120K-J-1/2W *CT-24SX10B CT-24SX10CB CT-F2510XB*
R360	ERG1SJ104P	RES,M 100K-J-1W *CT-20SX10B CT-20SX10CB CT-F2110XB*
R361	ER0S2TKF7681	RES,M 7.68K-F-1/4W *CT-20SX10B CT-20SX10CB CT-F2110XB*

REPLACEMENT PARTS LIST

Models: CT-20SX10B, CT-20SX10CB, CT-24SX10B, CT-24SX10CB CT-F2110XB & CT-F2510XB

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF NO.	PART NO.	DESCRIPTION
R361	ER0S2TKF8451	RES,M 7.68K-F-1/4W *CT-24SX10B CT-24SX10CB CT-F2510XB*
R362	ER0S2TKF1541	RES,M 1.54K-F-1/4W
R363	ERC12GK102V	RES,C 10K-F-1/4W *CT-24SX10B CT-24SX10CB CT-F2510XB*
R363	ERC12GK152V	RES,C 1.5K-K-1/2W *CT-20SX10B CT-20SX10CB CT-F2110XB*
R364	ERC12GK102V	RES,C 10K-F-1/4W *CT-24SX10B CT-24SX10CB CT-F2510XB*
R364	ERC12GK152V	RES,C 1.5K-K-1/2W *CT-20SX10B CT-20SX10CB CT-F2110XB*
R365	ERC12GK102V	RES,C 10K-F-1/4W *CT-24SX10B CT-24SX10CB CT-F2510XB*
R365	ERC12GK152V	RES,C 1.5K-K-1/2W *CT-20SX10B CT-20SX10CB CT-F2110XB*
R367	ERDS1TJ104T	RES,C 100K-J-1/2W
R368	ER0S2TKF1202	RES,M 12K-F-1/4W *CT-20SX10B CT-20SX10CB CT-F2110XB*
R368	ER0S2TKF1402	RES,M 14K-F-1/4W *CT-24SX10B CT-24SX10CB CT-F2510XB*
R369	ERDS2TJ102T	RES,C 1K-J-1/4W
R371	ERDS2TJ102T	RES,C 1K-J-1/4W
R372	ERDS2TJ102T	RES,C 1K-J-1/4W
R374	ERQ12AJ121P	RES,F 120-J-1/2W
R383	ERDS2TJ222T	RES,C 2.2K-J-1/4W
R384	ERDS2TJ104T	RES,C 100K-J-1/4W
R385	ERDS2TJ102T	RES,C 1K-J-1/4W
R401	ERJ6GEYJ101V	RES,M 100-J-1/10W
R402	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R403	ERDS2TJ104T	RES,C 100K-J-1/4W *CT-20SX10B CT-20SX10CB CT-F2110XB*
R403	ERDS2TJ125T	RES,C 1.2M-J-1/4W *CT-24SX10B CT-24SX10CB CT-F2510XB*
R405	ERDS2TJ304T	RES,C 300K-J-1/4W *CT-24SX10B CT-24SX10CB CT-F2510XB*
R407	ERDS2TJ304T	RES,C 300K-J-1/4W *CT-24SX10B CT-24SX10CB CT-F2510XB*
R408	ERJ6ENF2492V	RES,M 24.9K-F-1/10W
R409	ERJ6ENF1003V	RES,M 100K-F-1/10W
R450	ERDS2TJ821T	RES,C 820-J-1/4W
R451	ERG2FJ331H	RES,M 330-J-2W
R452	ERDS1FJ6R8T	RES,C 6.8-J-1/2W

REF NO.	PART NO.	DESCRIPTION
R453	ER0S2TKF1202	RES,M 12K-F-1/4W
R454	ERDS2TJ102T	RES,C 1K-J-1/4W *CT-24SX10B CT-24SX10CB CT-F2510XB*
R454	ERDS2TJ182T	RES,C 1.8K-J-1/4W *CT-20SX10B CT-20SX10CB CT-F2110XB*
R455	ERDS2TJ182T	RES,C 1.8K-J-1/4W *CT-20SX10B CT-20SX10CB CT-F2110XB*
R455	ERDS2TJ222T	RES,C 2.2K-J-1/4W *CT-24SX10B CT-24SX10CB CT-F2510XB*
R456	ERDS2TJ181T	RES,C 180-J-1/4W *CT-20SX10B CT-20SX10CB CT-F2110XB*
R456	ERDS2TJ821T	RES,C 820-J-1/4W *CT-24SX10B CT-24SX10CB CT-F2510XB*
R457	ERDS2TJ361T	RES,C 360-J-1/4W *CT-24SX10B CT-24SX10CB CT-F2510XB*
R457	ERDS2TJ681T	RES,C 680-J-1/4W *CT-20SX10B CT-20SX10CB CT-F2110XB*
R459	ERX1SJ1R2P	RES,M 1.2-J-1W *CT-20SX10B CT-20SX10CB CT-F2110XB*
R459	ERX1SJ1R5P	RES,M 1.5-J-1W *CT-24SX10B CT-24SX10CB CT-F2510XB*
R460	ER0S2TKF1402	RES,M 14K-F-1/4W *CT-24SX10B CT-24SX10CB CT-F2510XB*
R460	ER0S2TKF1432	RES,M 14.3-F-1/4W *CT-20SX10B CT-20SX10CB CT-F2110XB*
R461	ER0S2TKF1911	RES,M 1.91K-F-1/4W *CT-20SX10B CT-20SX10CB CT-F2110XB*
R461	ER0S2TKF2001	RES,M 2K-F-1/4W *CT-24SX10B CT-24SX10CB CT-F2510XB*
R468	ERDS2TJ104T	RES,C 100K-J-1/4W
R469	ERDS2TJ101T	RES,C 100-J-1/4W
R470	ERDS2TJ562T	RES,C 5.6K-J-1/4W
R471	ERDS2TJ224T	RES,C 220K-J-1/4W
R472	ERDS2TJ123T	RES,C 12K-J-1/4W
R473	**ERDS1FJ1R0T**	**RES,C 1.0-J-1/2W**
R475	**ERDS1FJ1R0T**	**RES,C 1.0-J-1/2W**
R476	ERDS2TJ272T	RES,C 2.7K-J-1/4W
R480	ERDS2TJ392T	RES,C 3.9K-J-1/4W
R481	ERDS1FJ1R0T	RES,C 1.0-J-1/2W *CT-24SX10B CT-24SX10CB CT-F2510XB*

REPLACEMENT PARTS LIST

Models: CT-20SX10B, CT-20SX10CB, CT-24SX10B, CT-24SX10CB CT-F2110XB & CT-F2510XB

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF NO.	PART NO.	DESCRIPTION
R481	ERDS1FJ1R8T	RES,C 1.8-J-1/2W *CT-20SX10B CT-20SX10CB CT-F2110XB*
R482	ERDS1FJ1R0T	RES,C 1.0-J-1/2W
R485	ERDS2TJ152T	RES,C 1.5K-J-1/4W
R486	ERDS2TJ473T	RES,C 47K-J-1/4W
R487	ERDS2TJ822T	RES,C 8.2K-J-1/4W
R489	ER0S2TKF1202	RES,M 12K-F-1/4W
R490	ER0S2TKF5101	RES,M 5.1K-F-1/4W
R491	ER0S2TKF1052	RES,M 10.5K-F-1/4W
R510	ERG2FJ332H	RES,M 3.30K-J-2W
R512	ERG3FJ222H	RES,M 2200-J-3W *CT-24SX10B CT-24SX10CB CT-F2510XB*
R512	ERG3FJ272H	RES,M 2.7K-J-3W *CT-20SX10B CT-20SX10CB CT-F2110XB*
R513	ERDS2TJ561T	RES,C 560-J-1/4W
R514	ERDS2TJ161T	RES,C 160-J-1/4W
R524	ERG1FJS122D	RES,M 1200-J-1W
R538	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R542	ERJ6GEYJ272V	RES,M 2.7K-J-1/10W
R546	ERJ6GEYJ561V	RES,M 560-J-1/10W
R550	ERJ6GEYJ682V	RES,M 6.8K-J-1/10W
R554	ERJ6GEYJ331V	RES,M 330-J-1/10W
R555	ERDS1TJ561T	RES,C 560-J-1/2W
R556	**ERQ1CJP1R8S**	**RES,F 1.8-J-1W *CT-20SX10B CT-20SX10CB CT-F2110XB***
R556	**ERQ1CKPR56S**	**RES,F .56-K-1W *CT-24SX10B CT-24SX10CB CT-F2510XB***
R557	ERF10ZK2R7	RES,W 2.7-K-10W
R561	ERDS2TJ103T	RES,C 10K-J-1/4W
R562	ERDS2TJ332T	RES,C 3.3K-J-1/4W *CT-24SX10B CT-24SX10CB CT-F2510XB*
R562	ERDS2TJ392T	RES,C 3.9K-J-1/4W *CT-20SX10B CT-20SX10CB CT-F2110XB*
R576	ERQ12AJ101	RES,F 100-J-1/2 *CT-24SX10B CT-24SX10CB CT-F2510XB*
R576	ERQ12AJ560	RES, F 56-J-1/2 *CT-20SX10B CT-20SX10CB CT-F2110XB*
R580	**ERD25FJ4R7P**	**RES,C 4.7-J-1/4W**
R581	**ER0S2TKF5601**	**RES,M 5.6K-F-1/4W *CT-20SX10B CT-20SX10CB CT-F2110XB***
R581	**ER0S2TKF5761**	**RES,M 5.76-F-1/4W *CT-24SX10B CT-24SX10CB CT-F2510XB***
R582	**ERJ6ENF1692V**	**RES,M 16.9K-F-1/10W**

REF NO.	PART NO.	DESCRIPTION
R590	ERDS2TJ563T	RES,C 56K-J-1/4W *CT-24SX10B CT-24SX10CB CT-F2510XB*
R590	ERDS2TJ683T	RES,C 68K-J-1/4W *CT-20SX10B CT-20SX10CB CT-F2110XB*
R594	ERJ6GEYJ104V	RES,M 100K-J-1/10W
R597	ER0S2TKF2202	RES,M 22K-F-1/4W *CT-24SX10B CT-24SX10CB CT-F2510XB*
R597	ER0S2TKF3302	RES,M 33K-F-1/4W *CT-20SX10B CT-20SX10CB CT-F2110XB*
R599	ERDS2TJ102T	RES,C 1K-J-1/4W
R601	ERDS2TJ152T	RES,C 1.5K-J-1/4W
R602	ERJ6GEYJ101V	RES,M 100-J-1/10W
R603	ERJ6GEYJ101V	RES,M 100-J-1/10W
R604	ERJ6GEYJ101V	RES,M 100-J-1/10W
R606	ERJ6GEYJ222V	RES,M 2.2K-J-1/10W
R607	ERJ6GEYJ391V	RES,M 390-J-1/10W
R608	ERJ6GEYJ333V	RES,M 33K-J-1/10W
R609	ERJ6GEYJ474V	RES,M 470K-J-1/10W
R610	ERDS2TJ622T	RES,C 2.7K-J-1/4W
R613	ERJ6GEYJ471V	RES,M 470-J-1/10W
R614	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R615	ERQ14AJ4R7P	RES,F 4.7-J-1/4W
R616	ERDS2TJ102T	RES,C 1K-J-1/4W
R618	ERJ6GEYJ474V	RES,M 470K-J-1/10W
R619	ERJ6GEYJ563V	RES,M 56K-J-1/10W
R620	ERJ6GEYJ153V	RES,M 15K-J-1/10W
R622	ERJ6GEYJ155V	RES,M 1.5MEG-J-1/10W
R701	ERDS2TJ102T	RES,C 1K-J-1/4W *CT-24SX10B CT-24SX10CB CT-F2510XB*
R701	ERDS2TJ153T	RES,C 15K-J-1/4W *CT-20SX10B CT-20SX10CB CT-F2110XB*
R702	ERDS2TJ102T	RES,C 1K-J-1/4W
R703	ERJ6GEYJ472V	RES,M 4.7K-J-1/10W
R704	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R705	ERDS2TJ332T	RES,C 3.3K-J-1/4W
R706	ERDS2TJ225T	RES,C 2.2M-J-1/4W *CT-24SX10B CT-24SX10CB CT-F2510XB*
R707	ERDS2TJ225T	RES,C 2.2M-J-1/4W *CT-24SX10B CT-24SX10CB CT-F2510XB*
R708	ERDS2TJ101T	RES,C 100-J-1/4W
R709	ERDS2TJ103T	RES,C 10K-J-1/4W
R710	ERDS2TJ103T	RES,C 10K-J-1/4W
R711	ERDS2TJ103T	RES,C 10K-J-1/4W
R712	ERDS2TJ222T	RES,C 2.2K-J-1/4W
R713	ERDS2TJ822T	RES,C 8.2K-J-1/4W

REPLACEMENT PARTS LIST

Models: CT-20SX10B, CT-20SX10CB, CT-24SX10B, CT-24SX10CB CT-F2110XB & CT-F2510XB

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF NO.	PART NO.	DESCRIPTION
R714	ERDS1FJ102T	RES,C 1K-J-1/2W
R716	ERDS2TJ101T	RES,C 100-J-1/4W
R717	ERDS2TJ101T	RES,C 100-J-1/4W
R718	ERDS2TJ223T	RES,C 22K-J-1/4W
R740	ERJ6ENF4022V	RES,M 40.2K-F-1/10W *CT-24SX10B CT-24SX10CB CT-F2510XB*
R740	ERJ6ENF6652V	RES,M 66.5K-F-1/10W *CT-20SX10B CT-20SX10CB CT-F2110XB*
R741	ERJ6ENF1272V	RES,M 12.7K-F-1/10W *CT-24SX10B CT-24SX10CB CT-F2510XB*
R741	ERJ6ENF8661V	RES,M 8.66K-F-1/10W *CT-20SX10B CT-20SX10CB CT-F2110XB*
R742	ERJ6ENF1432V	RES,M 14.3K-F-1/10W *CT-20SX10B CT-20SX10CB CT-F2110XB*
R742	ERJ6ENF6201V	RES,M 6.2K-F-1/10W *CT-24SX10B CT-24SX10CB CT-F2510XB*
R743	ERJ6ENF5602V	RES,M 56K-F-1/10W
R744	ERJ6ENF5602V	RES,M 56K-F-1/10W
R745	ERJ6ENF2002V	RES,M 20K-F-1/10W
R746	ERJ6GEYJ472V	RES,M 4.7K-J-1/10W
R747	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R752	ERDS2TJ103T	RES,C 10K-J-1/4W
R753	ERDS1FJ102T	RES,C 1K-J-1/2W
R754	ERDS1TJ202T	RES,C 2K-J-1/2W *CT-24SX10B CT-24SX10CB CT-F2510XB*
R754	ERDS1TJ822T	RES,C 8.2K-J-1/2W *CT-20SX10B CT-20SX10CB CT-F2110XB*
R756	ERG2FJ820H	RES,M 82-J-2W
R757	ERDS2TJ103T	RES,C 10K-J-1/4W
R758	ERDS2TJ331T	RES,C 330-J-1/4W
R801	**ERF15ZK1R2**	**RES,W 1.2-J-15W**
R805	ERDS2TJ102T	RES,C 1K-J-1/4W *CT-24SX10B CT-24SX10CB CT-F2510XB*
R805	ERDS2TJ132T	RES,C 1.3K-J-1/4W *CT-20SX10B CT-20SX10CB CT-F2110XB*
R811	ERG2FJ473H	RES,M 47K-J-2W
R812	ERG2FJ820H	RES,M 82-J-2W
R813	ERDS2TJ132T	RES,C 1.3K-J-1/4W *CT-24SX10B CT-24SX10CB CT-F2510XB*
R813	ERDS2TJ152T	RES,C 1.5K-J-1/4W *CT-20SX10B CT-20SX10CB CT-F2110XB*
R815	ERDS1FJ681T	RES,C 680-J-1/2
R816	ERX12SJR27P	RES,M .27-J-1/2W *CT-20SX10B CT-20SX10CB CT-F2110XB*
R816	ERX12SJR33P	RES,M .33-J-1/2W *CT-24SX10B CT-24SX10CB CT-F2510XB*
R817	ERX12SJR27P	RES,M .27-J-1/2W *CT-20SX10B CT-20SX10CB CT-F2110XB*
R817	ERX12SJR33P	RES,M .33-J-1/2W *CT-24SX10B CT-24SX10CB CT-F2510XB*
R819	ERX12SJR47P	RES,M .47-J-1/2W *CT-24SX10B CT-24SX10CB CT-F2510XB*
R821	ERDS1FJ1R5T	RES,C 1.5-J-1/2W *CT-24SX10B CT-24SX10CB CT-F2510XB*
R821	ERDS1FJ1R8T	RES,C 1.8-J-1/2W *CT-20SX10B CT-20SX10CB CT-F2110XB*
R822	ERDS1FJ102T	RES,C 1K-J-1/2W
R823	ERDS2TJ103T	RES,C 10K-J-1/4W
R826	ERDS2TJ332T	RES,C 3.3K-J-1/4W
R829	ERDS1FJ1R5T	RES,C 1.5-J-1/2W
R830	ERDS2TJ180T	RES,C 18-J-1/4W *CT-24SX10B CT-24SX10CB CT-F2510XB*
R830	ERDS2TJ330T	RES,C 33-J-1/4W *CT-20SX10B CT-20SX10CB CT-F2110XB*
R832	**ERC12ZGM825D**	**RES,S 8.2MEG-M-1/2**
R834	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R835	ERQ14AJ101P	RES,F 100-J-1/4W
R836	ERJ6GEYJ473V	RES,M 47K-J-1/10W
R837	ERDS2TJ222T	RES,C 2.2K-J-1/4W
R843	ERDS2TJ102T	RES,C 1K-J-1/4W *CT-20SX10B CT-20SX10CB CT-F2110XB*
R843	ERDS2TJ122T	RES,C 1.2K-J-1/4W *CT-24SX10B CT-24SX10CB CT-F2510XB*
R845	ERDS2TJ470T	RES,C 47-J-1/4W
R852	ERDS2TJ102T	RES,C 1K-J-1/4W
R854	ERDS2TJ913T	RES,C 91K-J-1/4W
R855	ERQ14AJW271E	RES,F 270-K-1/4W *CT-24SX10B CT-24SX10CB CT-F2510XB*
R856	ERG1SJ273P	RES,M 27K-J-1W
R857	ERDS2TJ223T	RES,C 22K-J-1/4W
R858	ERDS2TJ272T	RES,C 2.7K-J-1/4W
R859	ERDS2TJ123T	RES,C 12K-J-1/4W
R868	ERDS2TJ821T	RES,C 820-J-1/4W
R891	ERG3FJS220H	RES,M 22-J-3W

REPLACEMENT PARTS LIST

Models: CT-20SX10B, CT-20SX10CB, CT-24SX10B, CT-24SX10CB
CT-F2110XB & CT-F2510XB

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF NO.	PART NO.	DESCRIPTION
R901	ERJ6GEYJ331V	RES,M 330-J-1/10W
R902	ERJ6GEYJ561V	RES,M 560-J-1/10W
R903	ERJ6GEYJ681V	RES,M 680-J-1/10W
R904	ERJ6GEYJ151V	RES,M 150-J-1/10W
R905	ERJ6GEYJ183V	RES,M 18K-J-1/10W
R906	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R909	ERJ6GEYJ561V	RES,M 560-J-1/10W
R910	ERJ6GEYJ331V	RES,M 330-J-1/10W
R911	ERJ6GEYJ822V	RES,M 8.2K-J-1/10W
R912	ERJ6GEYJ104V	RES,M 100K-J-1/10W
R913	ERJ6GEYJ104V	RES,M 100K-J-1/10W
R914	ERJ6GEYJ104V	RES,M 100K-J-1/10W
R915	ERJ6GEYJ822V	RES,M 8.2K-J-1/10W
R917	ERJ6GEYJ101V	RES,M 100-J-1/10W
R918	ERJ6GEYJ331V	RES,M 330-J-1/10W
R919	ERJ6GEYJ561V	RES,M 560-J-1/10W
R922	ERDS2TJ331T	RES,C 330-J-1/4W
R923	ERJ6GEYJ101V	RES,M 100-J-1/10W
R924	ERJ6GEYJ473V	RES,M 47K-J-1/10W
R925	ERJ6GEYJ473V	RES,M 47K-J-1/10W
R926	ERJ6GEYJ751V	RES,M 750-J-1/10W
R927	ERJ6GEYJ162V	RES,M 1.6K-J-1/10W
R930	ERJ6GEYJ473V	RES,M 47K-J-1/10W
R931	ERJ6GEYJ272V	RES,M 2.7K-J-1/10W
R932	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R933	ERJ6GEYJ751V	RES,M 750-J-1/10W
R951	ERDS2TJ821T	RES,C 820-J-1/4W
R952	ERDS2TJ223T	RES,C 22K-J-1/4W
R953	ERDS2TJ332T	RES,C 3.3K-J-1/4W
R954	ERDS2TJ431T	RES,C 430-J-1/4W
R956	ERDS2TJ121T	RES,C 120-J-1/4W *CT-24SX10B CT-24SX10CB CT-F2510XB*
R956	ERDS2TJ750T	RES,C 75-J-1/4W *CT-20SX10B CT-20SX10CB CT-F2110XB*
R958	ERDS2TJ391T	RES,C 390-J-1/4W
R959	ERDS2TJ101T	RES,C 100-J-1/4W
R960	ERQ14AJ100E	RES,F 10-J-1/4W
R961	ERQ1CJP331S	RES,F 330-J-1W
R962	ERDS2TJ330T	RES,C 33-J-1/4W
R963	ERDS2TJ330T	RES,C 33-J-1/4W
R964	ERDS2TJ471T	RES,C 470-J-1/4W
R965	ERDS2TJ563T	RES,C 56K-J-1/4W
R966	ERDS1FVJ471T	RES,C 470-J-1/4W
R967	ERDS2TJ563T	RES,C 56K-J-1/4W
R968	ERDS2TJ471T	RES,C 470-J-1/4W
R969	ERDS2TJ390T	RES,C 39-J-1/2W
R970	ERDS2TJ2R7T	RES,C 2.7-J-1/4W
R971	ERDS2TJ2R7T	RES,C 2.7-J-1/4W

REF NO.	PART NO.	DESCRIPTION
R972	ERDS2TJ390T	RES,C 39-J-1/2W
R973	ERDS2TJ101T	RES,C 100-J-1/4W
R974	ERDS2TJ333T	RES,C 33K-J-1/4W
R975	ERDS2TJ101T	RES,C 100-J-1/4W
R976	ERDS2TJ101T	RES,C 100-J-1/4W
R977	ERDS2TJ561T	RES,C 560-J-1/4W
R978	ERDS2TJ101T	RES,C 100-J-1/4W
R987	ERDS2TJ472T	RES,C 4.7K-J-1/4
R988	ERDS2TJ331T	RES,C 330-J-1/4W
R989	ERDS2TJ682T	RES,C 6.8K-J-1/4W
R990	ERDS2TJ471T	RES,C 470-J-1/4W
R993	ERDS2TJ471T	RES,C 470-J-1/4W
R1051	ER0S2TKF1002	RES,M 10K-F-1/4
R1052	ERDS2TJ222T	RES,C 2.2K-J-1/4W
R1053	ERDS2TJ222T	RES,C 2.2K-J-1/4W
R1054	ERDS2TJ332T	RES,C 3.3K-J-1/4W
R1055	ERDS2TJ512T	RES,C 5.1K-J-1/4W
R1056	ERDS2TJ912T	RES,C 9.1K-J-1/4W
R1057	ERDS2TJ223T	RES,C 22K-J-1/4W
R1058	ERDS2TJ103T	RES,C 10K-J-1/4W
R1059	ERDS2TJ102T	RES,C 1K-J-1/4W
R1060	ERDS2TJ470T	RES,C 47-J-1/4W
R1061	ERDS2TJ102T	RES,C 1K-J-1/4W
R1062	ERDS2TJ102T	RES,C 1K-J-1/4W
R2301	ERJ6GEYJ562V	RES,M 5.6K-J-1/10W
R2302	ERJ6GEYJ4R7V	RES,M 4.7-J-1/10W
R2303	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R2305	ERJ6GEYJ681V	RES,M 680-J-1/10W
R2307	ER0S2TKF1372	RES,M 13.7K-F-1/4W
R2308	ER0S2TKF5361	RES,M 5.36K-F-1/4W
R2309	ER0S2TKF1502	RES,M 15.0K-F-1/4
R2310	ERJ6GEYJ183V	RES,M 18K-J-1/10W
R2311	ERJ6GEYJ562V	RES,M 5.6K-J-1/10W
R2312	ERJ6GEYJ4R7V	RES,M 4.7-J-1/10W
R2313	ERJ6GEYJ472V	RES,M 4.7K-J-1/10W
R2314	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R2315	ERJ6GEYJ681V	RES,M 680-J-1/10W
R2321	ERJ6GEYJ472V	RES,M 4.7K-J-1/10W
R2322	ERDS2TJ222T	RES,C 2.2K-J-1/4W
R2323	ERJ6GEYJ271V	RES,M 270-J-1/10W
R2324	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R2325	ERJ6GEYJ223V	RES,M 22K-J-1/10W
R2326	ER0S2TKF1502	RES,M 15.0K-F-1/4
R2330	ERX1SJ1R0P	RES,M 1.0-J-1W
R2331	ERX1SJ1R0P	RES,M 1.0-J-1W
R2339	ERJ6GEYJ184V	RES,M 180K-J-1/10W
R2340	ERJ6GEYJ184V	RES,M 180K-J-1/10W
R2353	ERJ6GEYJ183V	RES,M 18K-J-1/10W
R2354	ERJ6GEYJ472V	RES,M 4.7K-J-1/10W

REPLACEMENT PARTS LIST

Models: CT-20SX10B, CT-20SX10CB, CT-24SX10B, CT-24SX10CB
CT-F2110XB & CT-F2510XB

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF NO.	PART NO.	DESCRIPTION
R2355	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R2356	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R2357	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R2358	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R2359	ERDS2TJ222T	RES,C 2.2K-J-1/4W
R2359	ERJ6GEYJ332V	RES,M 3.3K-J-1/10W
R2360	ERDS2TJ222T	RES,C 2.2K-J-1/4W
R2362	ERJ6GEYJ332V	RES,M 3.3K-J-1/10W
R2365	ERJ6GEYJ472V	RES,M 4.7K-J-1/10W
R2366	ERJ6GEYJ183V	RES,M 18K-J-1/10W
R2367	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R2368	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R2369	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R2370	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R2371	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R2372	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R2373	ERDS1TJ561T	RES,C 560-J-1/2W
R2373	ERJ6GEYJ223V	RES,M 22K-J-1/10W
R2374	ERDS1TJ561T	RES,C 560-J-1/2W
R2375	ERDS1TJ820T	RES,C 82-J-1/2W
R2380	ERDS1TJ820T	RES,C 82-J-1/2W
R2403	ERJ6GEYJ473V	RES,M 47K-J-1/10W
R2404	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R2407	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R2427	ERJ6GEYJ472V	RES,M 4.7K-J-1/10W
R2429	ERJ6GEYJ123V	RES,M 12K-J-1/10W
R2430	ER0S2TKF2202	RES,M 22K-F-1/4W
R2433	ERJ6GEYJ123V	RES,M 12K-J-1/10W
R2434	ERJ6ENF1602V	RES,M 16K-F-1/4W
R2439	ERJ6GEYJ224V	RES,M 220K-J-1/10W
R2440	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R2441	ERJ6GEYJ470V	RES,M 47-J-1/10W
R2443	ERJ6GEYJ470V	RES,M 47-J-1/10W
R2451	ERJ6GEYJ104V	RES,M 100K-J-1/10W
R3001	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R3003	ERJ6GEYJ184V	RES,M 180K-J-1/10W
R3004	ERJ6GEYJ184V	RES,M 180K-J-1/10W
R3005	ERJ6GEYJ153V	RES,M 15K-J-1/10W
R3006	ERJ6GEYJ221V	RES,M 220-J-1/10W
R3007	ERJ6GEYJ184V	RES,M 180K-J-1/10W
R3008	ERJ6GEYJ184V	RES,M 180K-J-1/10W
R3009	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R3010	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R3013	ERJ6GEYJ221V	RES,M 220-J-1/10W
R3018	ERJ6GEYJ750V	RES,M 75-J-1/10W
R3019	ERJ6GEYJ331V	RES,M 330-J-1/10W
R3020	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R3021	ERJ6GEYJ221V	RES,M 220-J-1/10W
R3022	ERJ6GEYJ750V	RES,M 75-J-1/10W

REF NO.	PART NO.	DESCRIPTION
R3023	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R3024	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R3025	ERJ6GEYJ392V	RES,M 3.9K-J-1/10W
R3028	ERJ6GEYJ750V	RES,M 75-J-1/10W
R3029	ERJ6GEYJ221V	RES,M 220-J-1/10W
R3031	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R3032	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R3037	ERJ6GEYJ560V	RES,M 56-J-1/10W
R3038	ERJ6GEYJ560V	RES,M 56-J-1/10W
R3040	ERJ6GEYJ221V	RES,M 220-J-1/10W
R3042	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R3043	ERJ6GEYJ221V	RES,M 220-J-1/10W
R3047	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R3048	ERJ6GEYJ221V	RES,M 220-J-1/10W
R3053	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R3062	ERJ6GEYJ221V	RES,M 220-J-1/10W
R3066	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R3067	ERJ6GEYJ221V	RES,M 220-J-1/10W
R3068	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R3071	ERJ6GEYJ750V	RES,M 75-J-1/10W
R3073	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R3074	ERJ6GEYJ153V	RES,M 15K-J-1/10W
R3075	ERJ6GEYJ392V	RES,M 3.9K-J-1/10W
R3080	ERJ6GEYJ750V	RES,M 75-J-1/10W
R3081	ERJ6GEYJ153V	RES,M 15K-J-1/10W
R3082	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R3083	ERJ6GEYJ392V	RES,M 3.9K-J-1/10W
R3086	ERJ6GEYJ750V	RES,M 75-J-1/10W
R3090	ERJ6GEYJ331V	RES,M 330-J-1/10W
R3091	ERJ6GEYJ331V	RES,M 330-J-1/10W
R3092	ERJ6GEYJ184V	RES,M 180K-J-1/10W
R3098	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R3104	ERJ6GEYJ750V	RES,M 75-J-1/10W
R3106	ERJ6GEYJ184V	RES,M 180K-J-1/10W
R3109	ERJ6GEYJ331V	RES,M 330-J-1/10W
R3112	ERJ6GEYJ471V	RES,M 470-J-1/10W
R3179	ERJ6GEYJ750V	RES,M 75-J-1/10W
R3180	ERJ6GEYJ750V	RES,M 75-J-1/10W
R3181	ERJ6GEYJ750V	RES,M 75-J-1/10W
R3182	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R6502	ERJ6GEYJ471V	RES,M 470-J-1/10W
R6503	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R6504	ERJ6GEYJ104V	RES,M 100K-J-1/10W
R6505	ERJ6GEYJ512V	RES,M 5.1K-J-1/10W
R6506	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R6507	ERJ6GEYJ514V	RES,M 510K-J-1/10W
R6509	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R6510	ERJ6GEYJ101V	RES,M 100-J-1/10W
R6511	ERJ6GEYJ471V	RES,M 470-J-1/10W

REPLACEMENT PARTS LIST

Models: CT-20SX10B, CT-20SX10CB, CT-24SX10B, CT-24SX10CB CT-F2110XB & CT-F2510XB

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF NO.	PART NO.	DESCRIPTION
R6517	ERJ6GEYJ471V	RES,M 470-J-1/10W
R6518	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R6519	ERJ6GEYJ822V	RES,M 8.2K-J-1/10W
R6521	ERJ6ENF3240V	RES,M 324-F-1/10W
R6522	ERJ6GEYJ471V	RES,M 470-J-1/10W
R6523	ERJ6ENF3320V	RES,M 332-F-1/10W
R6524	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R6530	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R6531	ERJ6ENF1131V	RES,M 1.13K-F-1/10W
R6532	ERJ6GEYJ821V	RES,M 820-J-1/10W
R6533	ERJ6GEYJ471V	RES,M 470-J-1/10W
R6535	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R6545	ERJ6GEYJ822V	RES,M 8.2K-J-1/10W
R6547	ERJ6GEYJ911V	RES,M 910-J-1/10W
R6548	ERJ6GEYJ821V	RES,M 820-J-1/10W
R6549	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R6550	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R6552	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R6555	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R6559	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R6561	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R6562	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R6563	ERJ6ENF1131V	RES,M 1.13K-F-1/10W
R6564	ERJ6ENF1780V	RES,M 178-F-1/10
R6565	ERJ6GEYJ471V	RES,M 470-J-1/10W
R6566	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R6567	ERJ6GEYJ101V	RES,M 100-J-1/10W
R6569	ERJ6GEYJ101V	RES,M 100-J-1/10W
R6570	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R6571	ERJ6GEYJ123V	RES,M 12K-J-1/10W
R6572	ERJ6GEYJ101V	RES,M 100-J-1/10W
R6575	ERJ6GEYJ821V	RES,M 820-J-1/10W
R6576	ERJ6GEYJ102V	RES,M 1K-J-1/10W
	SWITCHES	
S001	TSE2AD002	SWITCH, PUSH
S002	EVQPBD05R	SWITCH
S003	EVQPBD05R	SWITCH
S004	EVQPBD05R	SWITCH
S005	EVQPBD05R	SWITCH
S006	EVQPBD05R	SWITCH
S007	EVQPBD05R	SWITCH
	TRANSFORMERS	
T001	**TLP16297**	**TRANSFORMER, POWER SUPPLY**
T501	ETH19Y70AY	TRANSFORMER, HORIZONTAL DRIVER
T551	**ZTFN05001A**	**TRANSFORMER, FLY BACK** ***CT-20SX10B CT-20SX10CB CT-F2110XB***

REF NO.	PART NO.	DESCRIPTION
T551	**ZTFN05003A**	**TRANSFORMER, FLY BACK** ***CT-24SX10B CT-24SX10CB CT-F2510XB***
T801	**ETS39AG2M5NC**	**TRANSFORMER, SWITCHING** ***CT-24SX10B CT-24SX10CB CT-F2510XB***
T801	**ETS39AG2T5NC**	**TRANSFORMER, SWITCHING** ***CT-20SX10B CT-20SX10CB CT-F2110XB***
	CRYSTALS/FILTERS	
X301	TSS2AA001	CRYSTAL, 3.58MHZ
X302	TAFCSB503F30	CRYSTAL
X1101	TSSA092	CRYSTAL OSCILLATOR
	OTHERS	
TNR001	ENGE6101D	TUNER
M001	**A51LSK955X-A**	**CRT 20"** ***CT-20SX10B CT-20SX10CB CT-F2110XB***
M002	**A60LUQ085X**	**CRT 25"** ***CT-24SX10B CT-24SX10CB CT-F2510XB***
DY	KDY3NWA35F	YOKE, DEFLECTION *CT-20SX10B CT-20SX10CB CT-F2110XB*
DY	KDY4QHA31F	YOKE, DEFLECTION *CT-24SX10B CT-24SX10CB CT-F2510XB CT-24SX10B*
M003	**TJSC01200**	**CRT SOCKET**
DEG	**TSP2AA014**	**COIL, DEGAUSSING 25"** ***CT-24SX10B CT-24SX10CB CT-F2510XB***
DEG	**TSP2AA018**	**COIL, DEGAUSSING 20"** ***CT-20SX10B CT-20SX10CB CT-F2110XB***
M004	TXF3A011DB2	ASSY. DAG GROUND *CT-20SX10BM CT-20SX10CBM CT-F2110XBM*
M005	TXF3A0190DA	ASSY., DAG GND *CT-24SX10B CT-24SX10CB CT-F2510XB*
M006	0FMK014ZZ	CONVERGENCE CORRECTOR STRIP
M007	ETC35C65NA	CONVERGENCE YOKE *CT-20SX10B CT-20SX10CB CT-F2110XB*
M008	EUR511502	REMOTE CONTROL
M009	UR51EC975	BATTERY COVER, REMOTE
M010	TXANV13BSER	SPEAKER KIT
M011	TBM2A30843	PANASONIC BADGE *CT-24SX10B CT-24SX10CB CT-F2510XB*
M012	TBM4G3008	PANASONIC BADGE *CT-20SX10B CT-20SX10CB CT-F2110XB*
M013	TBX4G85700	POWER BUTTON
M014	TEK6940	DOOR CATCH
M015	TKK4G8533	LED PANEL

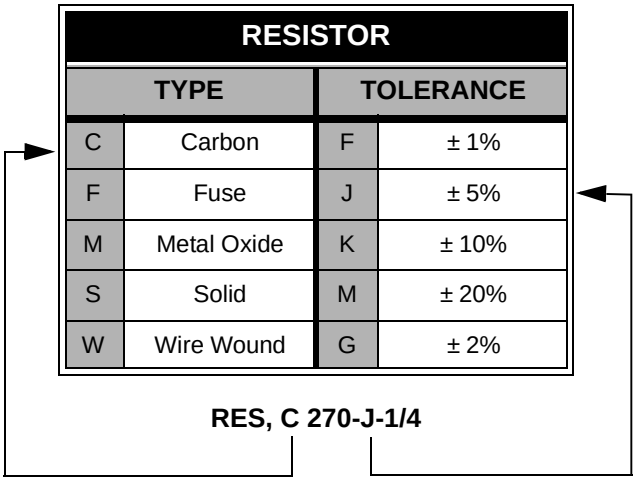
REPLACEMENT PARTS LIST

Models: CT-20SX10B, CT-20SX10CB, CT-24SX10B, CT-24SX10CB CT-F2110XB & CT-F2510XB

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

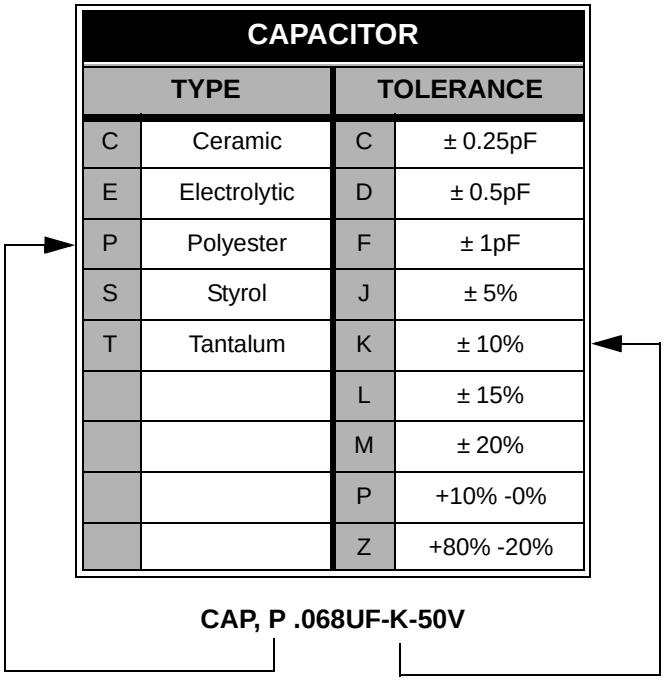
M016	TKP4G11950	REAR A/V BRACKET
M017	TQB2AA0363	MANUAL, OWNERS *CT-20SX10B CT-24SX10B CT-F2510XB CT-F2110XB*
M018	TQB2AA0364	MANUAL, OWNERS *CT-20SX10CB CT-24SX10CB*
M019	TQB2AA7058	REMOTE GUIDE
M020	TQB2AA7076	V-CHIP ROLLER GUIDE
M021	TXFKY35BSER	ASSY, CABINET FRONT *CT-24SX10B CT-24SX10CB*
M022	TXFKU57BSER	ASSY, CABINET BACK *CT-24SX10B CT-24SX10CB CT-F2510XB*
M023	TXFKY31BSER	ASSY, CABINET FRONT *CT-20SX10B CT-20SX10CB*
M024	TXFKU54BSER	ASSY, CABINET BACK *CT-20SX10B CT-20SX10CB CT-F21110XB*
M025	TXFKY32BSER	ASSY, CABINET FRONT *CT-F2110XB*
M026	TXFKY36BSER	ASSY, CABINET FRONT *CT-F2510XB*
M027	TKP4G11470S	ASSY, CONTROL DOOR *CT-20SX10B CT-20SX10CB CT-F2110XB*
M028	TKP4G11490S	ASSY, CONTROL DOOR *CT-24SX10B CT-24SX10CB CT-F2510XB*
M029	**TXASX2710FHS**	**ASSY., LINE CORD**
M030	TXANV14BSER	EXT. CABLE KIT(25 pins)
M031	TXANV15BSER	EXT. CABLE KIT(8 & 6 pins)
JK3001	TJB2AA0271	TERMINAL, REAR A/V
JK3151	TJBA125	TERMINAL, FRONT A/V, S-VHS

DESCRIPTION OF ABBREVIATIONS GUIDE



RESISTOR			
TYPE		TOLERANCE	
C	Carbon	F	± 1%
F	Fuse	J	± 5%
M	Metal Oxide	K	± 10%
S	Solid	M	± 20%
W	Wire Wound	G	± 2%

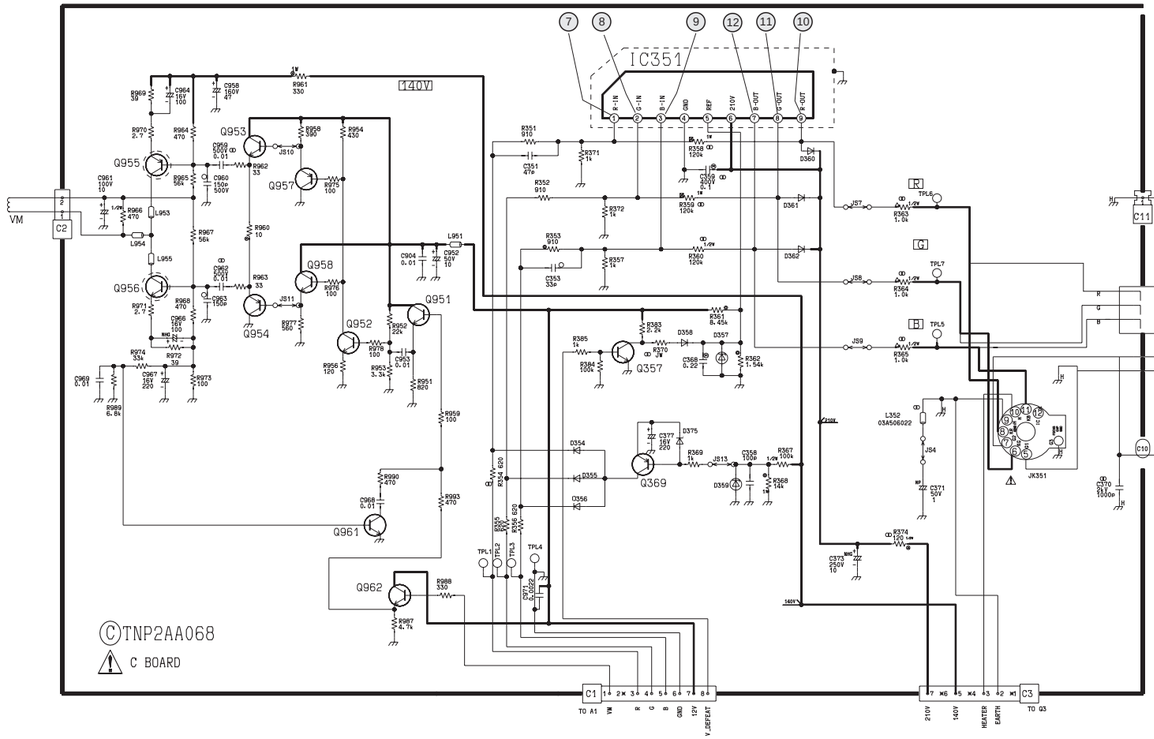
RES, C 270-J-1/4

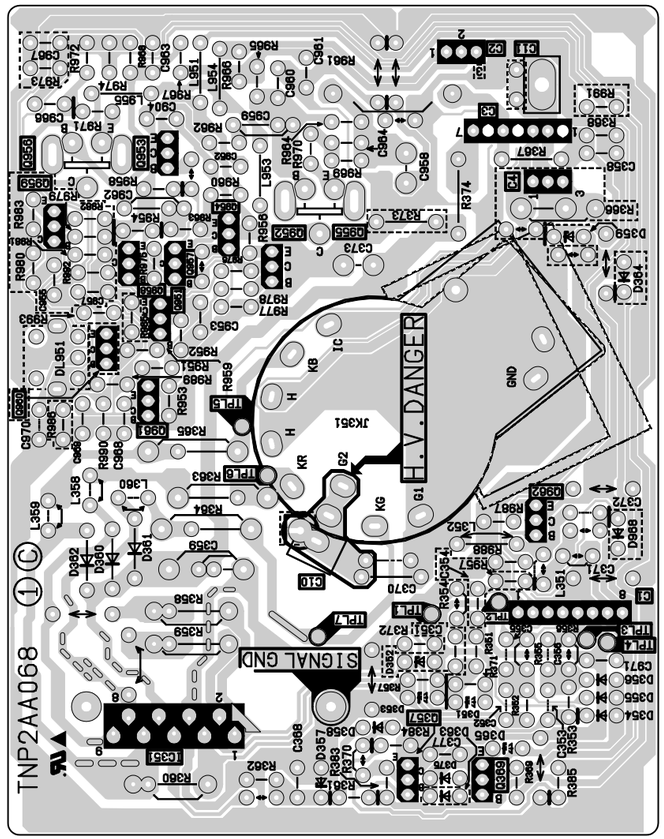


CAPACITOR			
TYPE		TOLERANCE	
C	Ceramic	C	± 0.25pF
E	Electrolytic	D	± 0.5pF
P	Polyester	F	± 1pF
S	Styrol	J	± 5%
T	Tantalum	K	± 10%
		L	± 15%
		M	± 20%
		P	+10% -0%
		Z	+80% -20%

CAP, P .068UF-K-50V

NOTES:



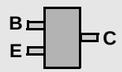


	Q357	Q369	Q951	Q952	Q953	Q954
E	0.69	14.83	6.79	1.48	9.51	8.18
B	0.00	0.00	11.90	8.86	11.90	GND
C	GND	14.63	6.14	0.84	8.98	8.82

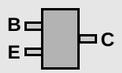
	Q955	Q956	Q957	Q958	Q961	Q962
E	137.3	0.93	8.86	8.85	0.00	1.48
B	69.8	69.9	GND	11.90	0.00	8.86
C	13.8	450.5	9.51	8.18	GND	0.84

IC 351	
1	1.71
2	1.71
3	1.71
4	GND
5	1.82
6	220.00
7	127.00
8	131.00
9	122.00

IDENTIFICACIÓN DE TERMINALES PARA TRANSISTORES EN *CHIP*



CHIP TRANSISTOR LEAD DESIGNATION



Nota:

La medición de los voltajes se hizo con un Voltímetro Digital.

Note:

Obtained voltages with a multimeter.

IMPORTANT SAFETY NOTICE

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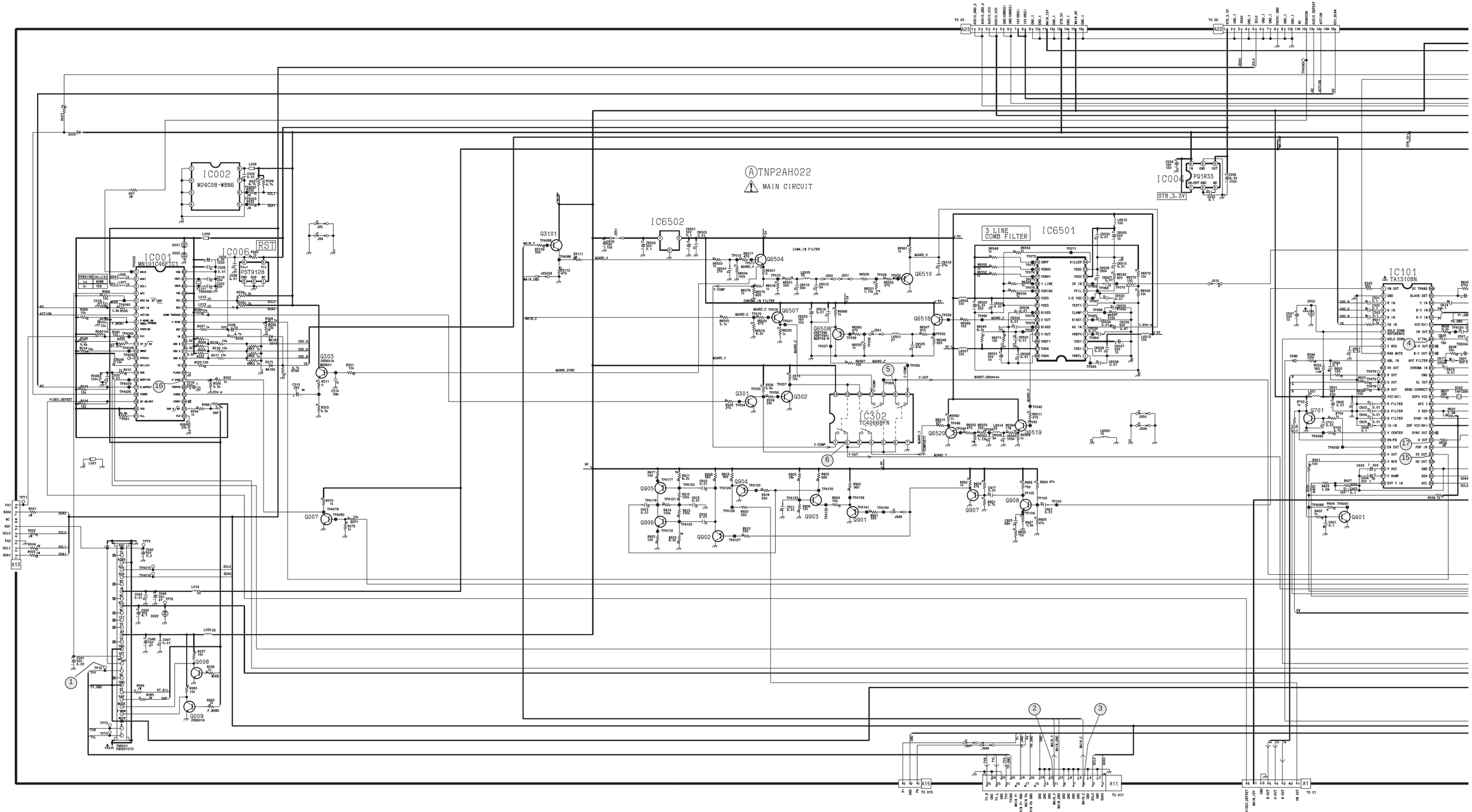
NOTA DE SEGURIDAD

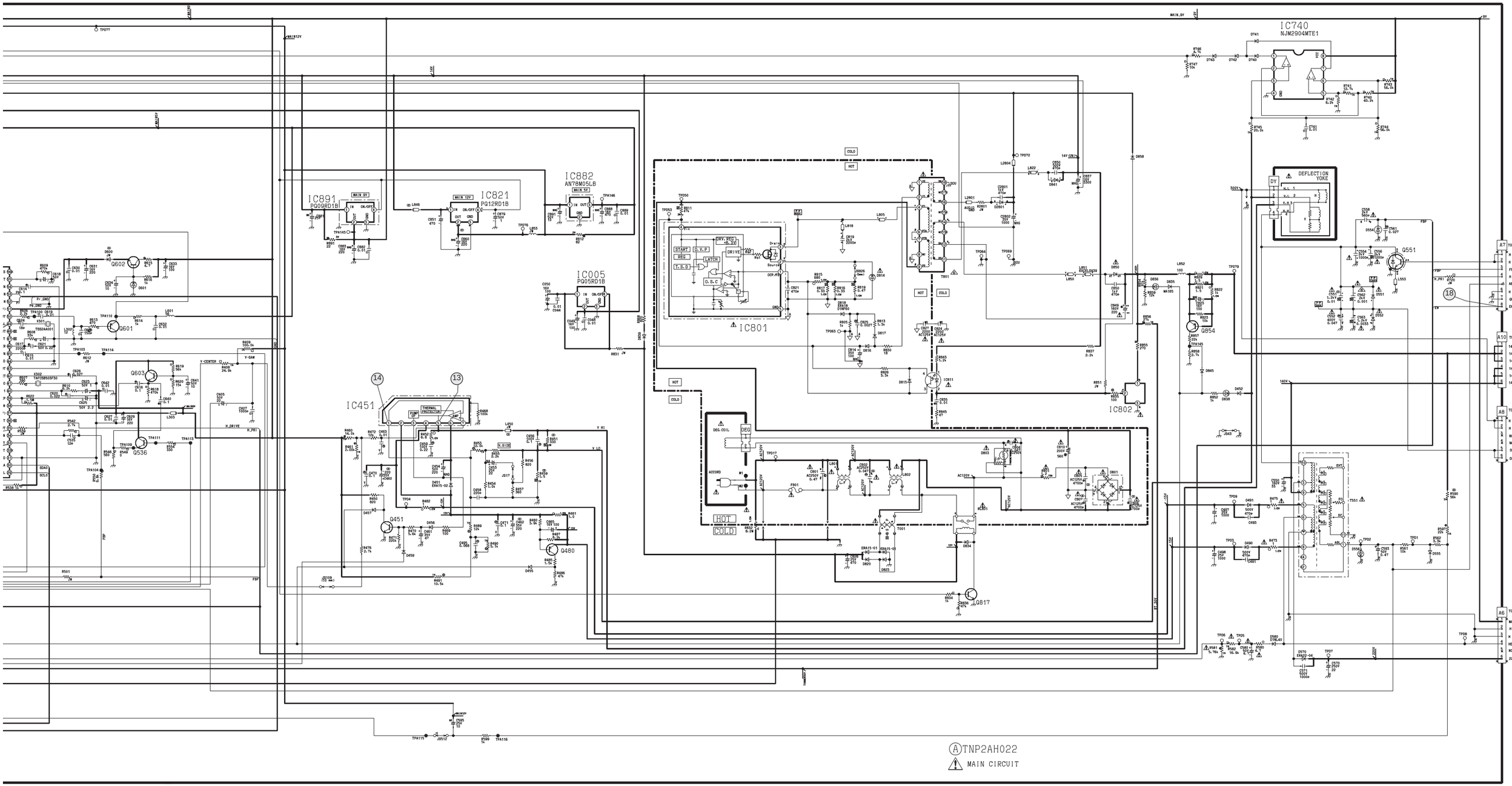
LOS DIAGRAMAS ELÉCTRICOS INCLUYEN CARACTERÍSTICAS ESPECIALES MUY IMPORTANTES PARA LA PROTECCIÓN CONTRA RAYOS-X, QUEMADURAS Y DESCARGAS ELÉCTRICAS. CUANDO SE DE SERVICIO ES IMPORTANTE USAR PARA REEMPLAZO DE COMPONENTES CRITICOS, SOLO PARTES ESPECIFICADAS POR EL FABRICANTES. LOS COMPONENTES CRITICOS ESTAN SEÑALADOS EN LOS DIAGRAMAS POR EL SIMBOLO ⚠.

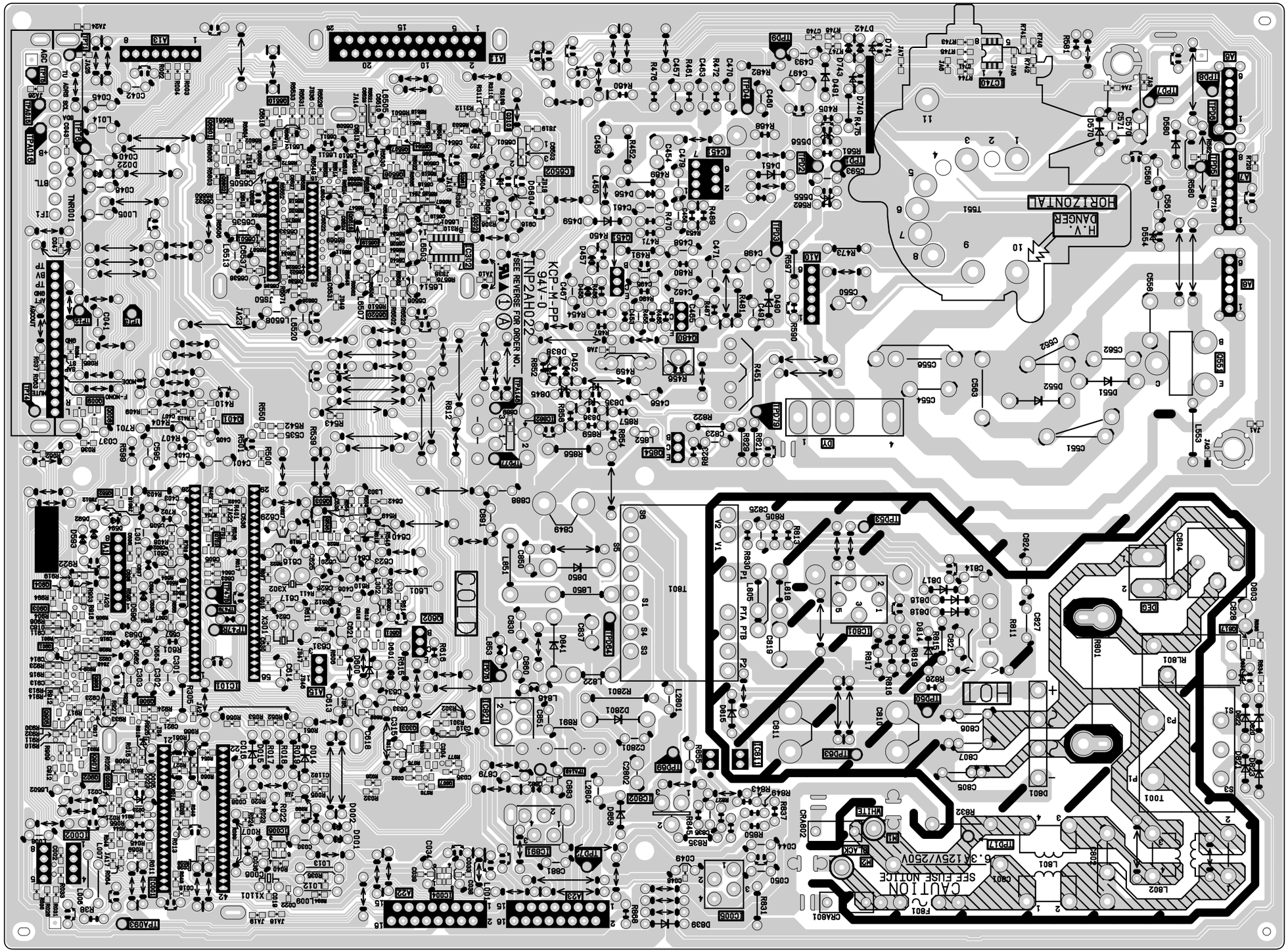
A-BOARD SCHEMATIC DIAGRAM, LEFT PORTION - DIAGRAMA ELECTRICO TARJETA A, SECCION IZQUIERDA

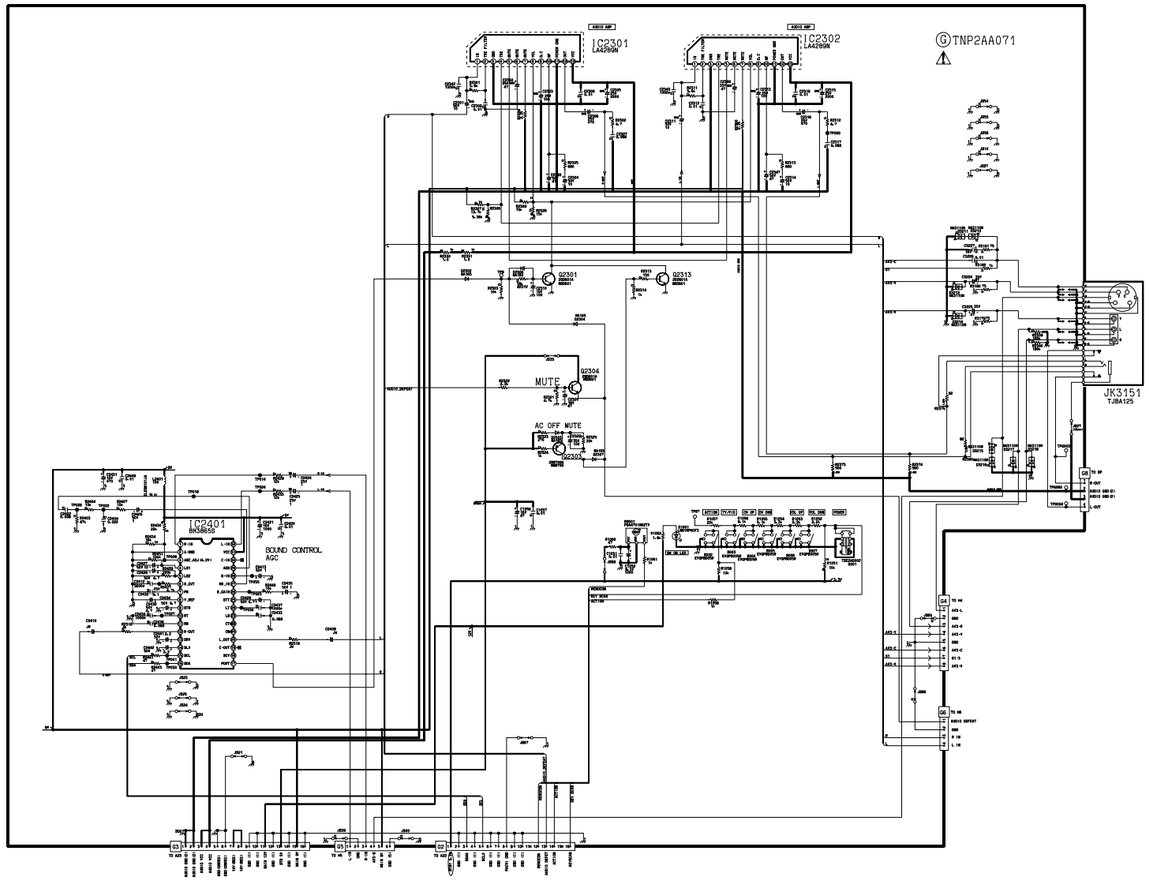


A-BOARD SCHEMATIC, RIGHT PORTION - DIAGRAMA ELECTRICO TARJETA A, SECCION DERECHA

ALL MODELS

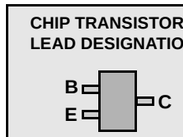



HORIZONTAL
H.V.
DANGER
HOT
COLD
CAUTION
SEE FUSE NOTICE
6.3A 125V/250V
TNP2AH022
KCP-M-PD
94V-0
SEE REVERSE FOR ORDER NO.



	Q2301	Q2303	Q2304
E	0.00	13.07	0.00
B	1.79	0.00	4.98
C	GND	12.23	0.00

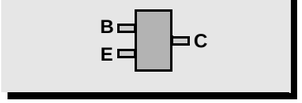
CHIP TRANSISTOR LEAD DESIGNATION



IC2301		IC2302	
1	4.19	1	4.19
2	4.19	2	4.19
3	GND	3	GND
4	2.49	4	2.49
5	0.00	5	0.00
6	8.85	6	8.85
7	8.87	7	8.86
8	4.78	8	4.78
9	11.16	9	11.16
10	11.06	10	11.02
11	GND	11	GND
12	11.12	12	11.08
13	24.11	13	24.11

IC2401			
1	4.36	17	0.00
2	GND	18	n.c
3	2.55	19	n.c
4	0.00	20	4..38
5	0.10	21	n.c
6	4.43	22	n.c
7	4.39	23	4.37
8	4.38	24	4.35
9	0.00	25	0.00
10	4.36	26	4.39
11	4.37	27	4.38
12	4.38	28	4.38
13	0.00	29	4.36
14	0.00	30	n.c
15	2.14	31	8.80
16	2.14	32	4.36

IDENTIFICACIÓN DE TERMINALES PARA TRANSISTORES EN *CHIP*



Schematic Notes

1. Resistors are carbon 1/4W unless noted otherwise.
2. Capacitors are ceramic 50V unless noted otherwise.
3. Coil value notes is inductance in µH.
4. Test point indicated by ● ; Test point but no pin ○.
5. Components indicated with ⚠ are critical parts and replacement should be made with manufacture specified replacement parts only.
6. ▬ (**BOLD LINE**) indicates the route of B+ supply.
7. The schematic diagrams are current at the time of printing and are subject to change without notice.
8. Ground symbol indicates **HOT GROUND CONNECTION**; indicates COLD GROUND.

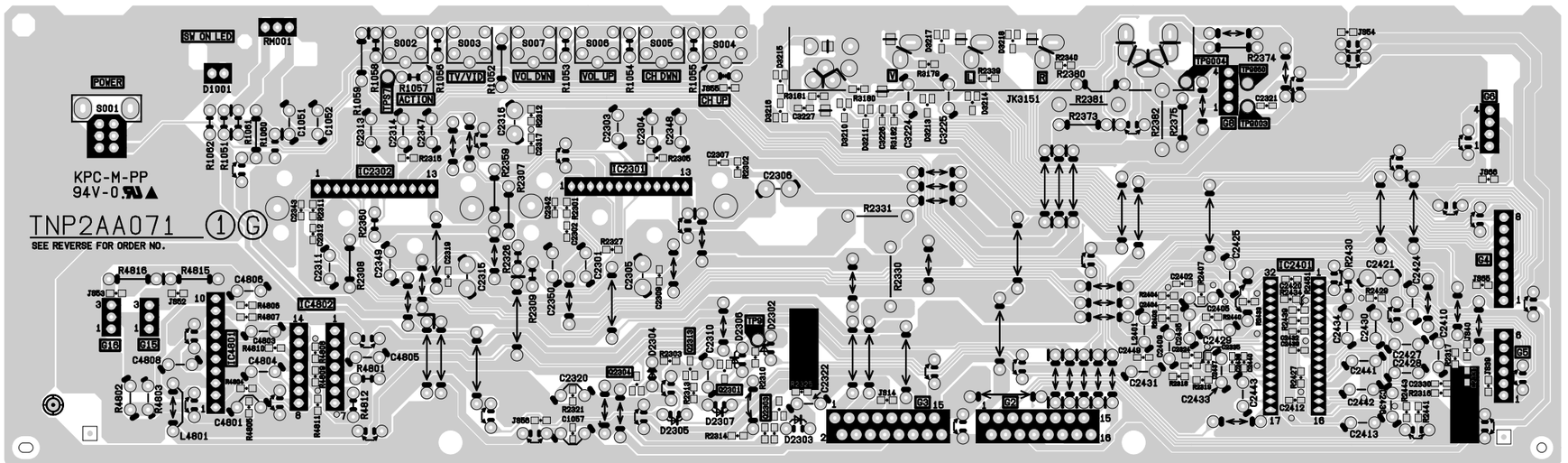
NOTE: All other component symbols are used for engineering design purposes.

Nota:

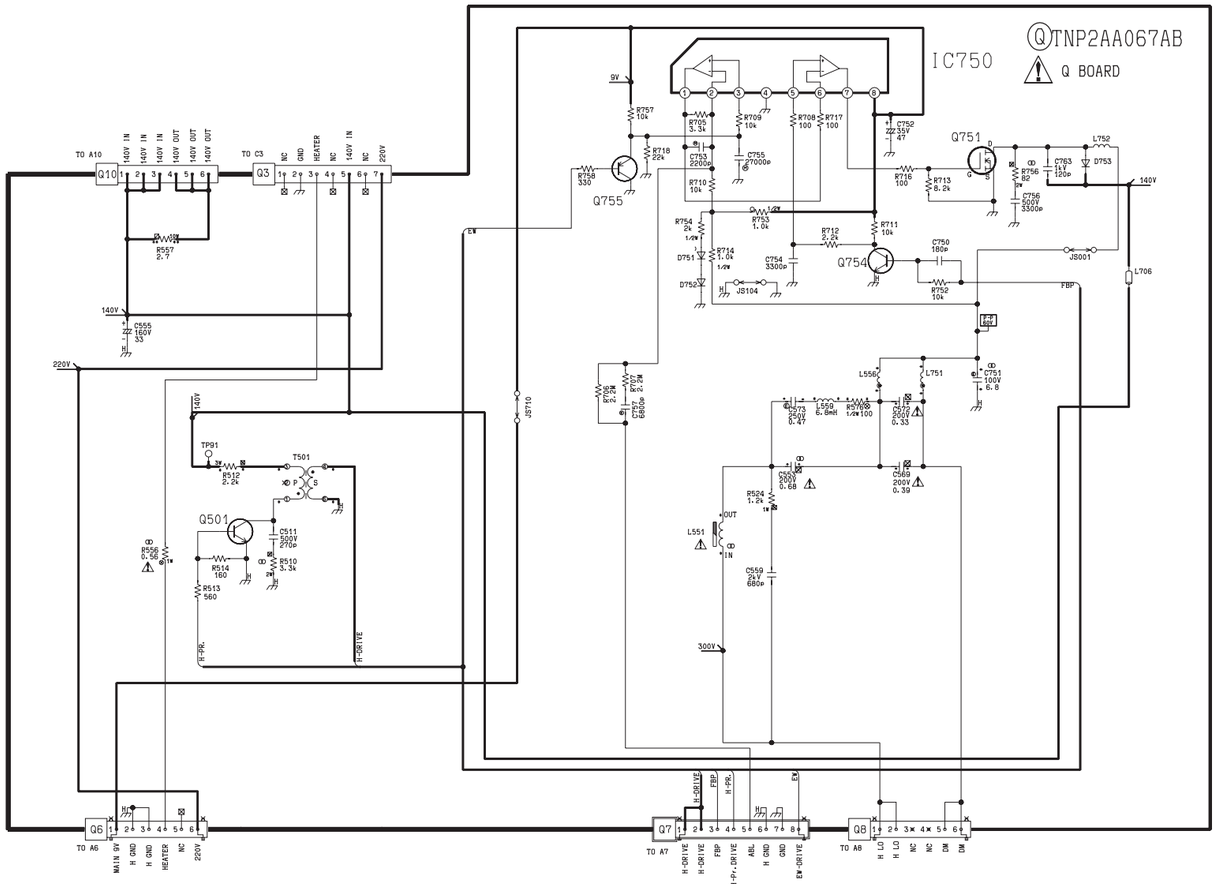
La medición de los voltajes se hizo con un Voltímetro Digital.

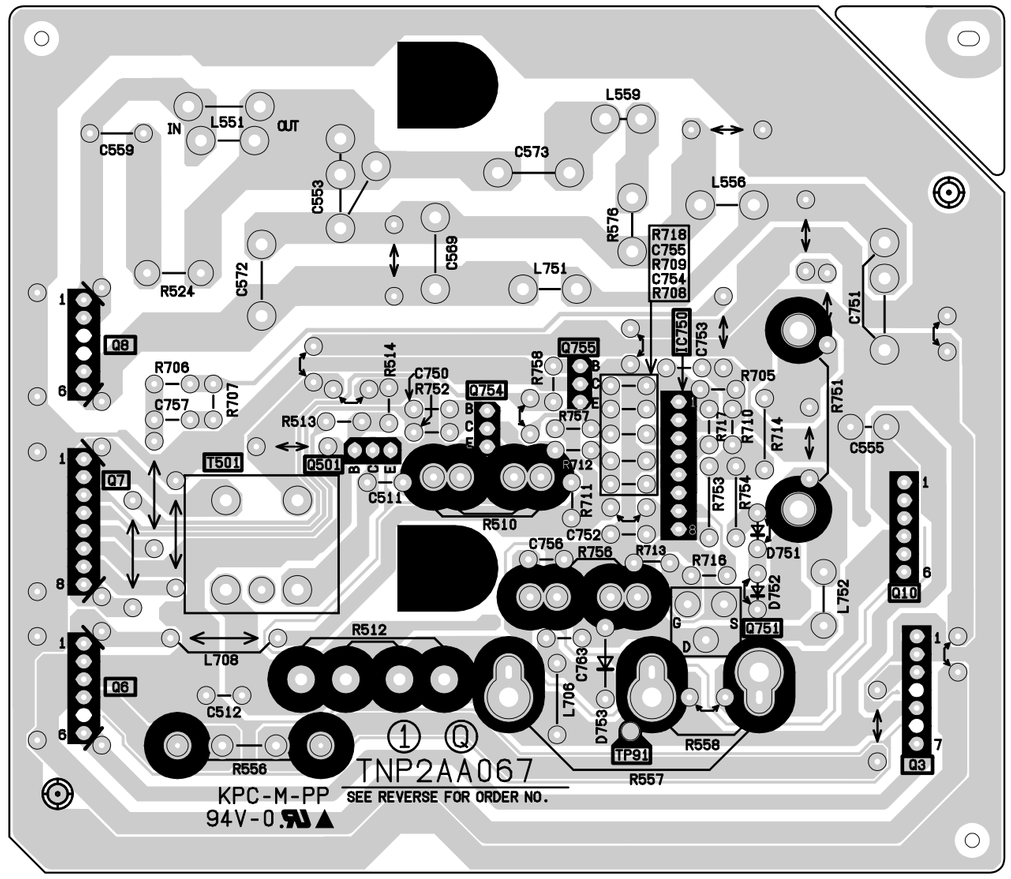
Note:

Obtained voltages with a digital multimeter.



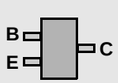
Q-BOARD SCHEMATIC DIAGRAM, LAYOUT & VOLTAGES - DIAGRAMA ELECTRICO, DE CIRCUITO IMPRESO Y VOLTAJES TARJETA Q



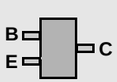


	Q501	Q751	Q754	Q755
E	0.00	6.69	0.00	4.27
B	80.00	20.44	4.70	GND
C	0.00	GND	GND	4.82

IDENTIFICACIÓN DE TERMINALES PARA TRANSISTORES EN *CHIP*



CHIP TRANSISTOR LEAD DESIGNATION



IC750
1 . . . . . 3.03
2 . . . . . 4.85
3 . . . . . 4.84
4 . . . . . GND
5 . . . . . 4.72
6 . . . . . 2.99
7 . . . . . 6.77
8 . . . . . 8.88

Nota:

La medición de los voltajes se hizo con un Voltímetro Digital.

Note:

Obtained voltages with a digital multimeter.

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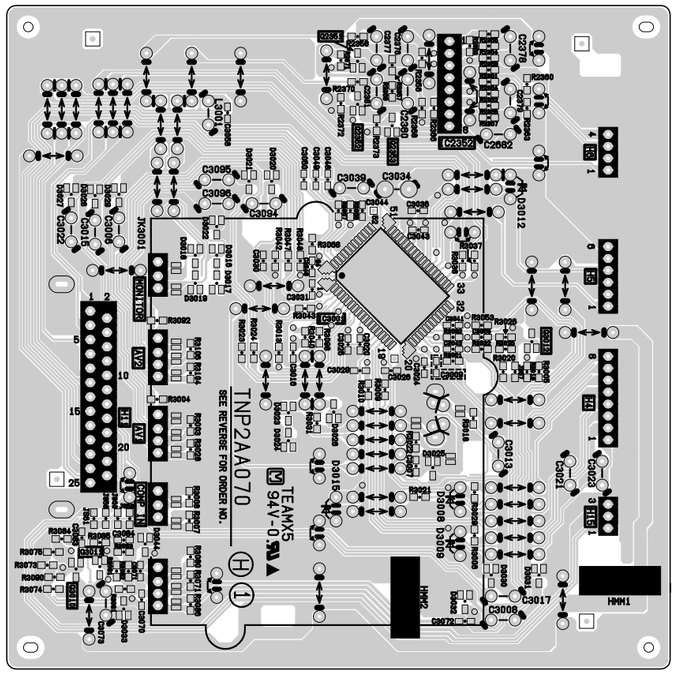


	Q2351	Q2352	Q2353	Q3010	Q3011	Q3012
E	0.00	13.07	0.00	0.00	0.00	0.00
B	1.79	0.00	4.98	4.98	4.98	4.98
C	GND	12.23	0.00	0.00	0.00	0.00

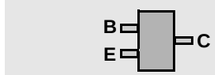
Nota:

La medición de los voltajes se hizo con un Voltímetro Digital.

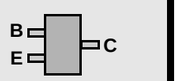
Note:

Obtained voltages with a digital multimeter.

IDENTIFICACIÓN DE TERMINALES PARA TRANSISTORES EN *CHIP*

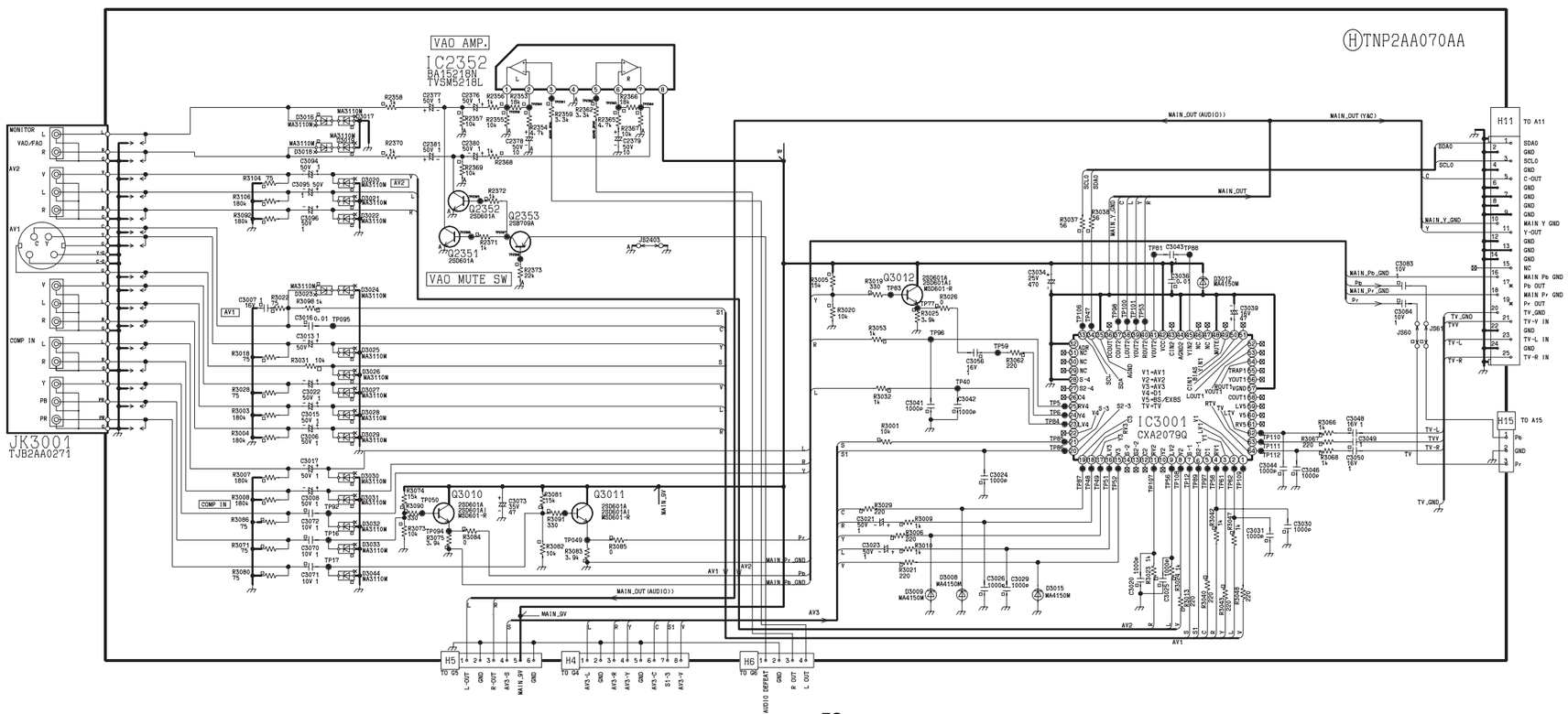


CHIP TRANSISTOR LEAD DESIGNATION

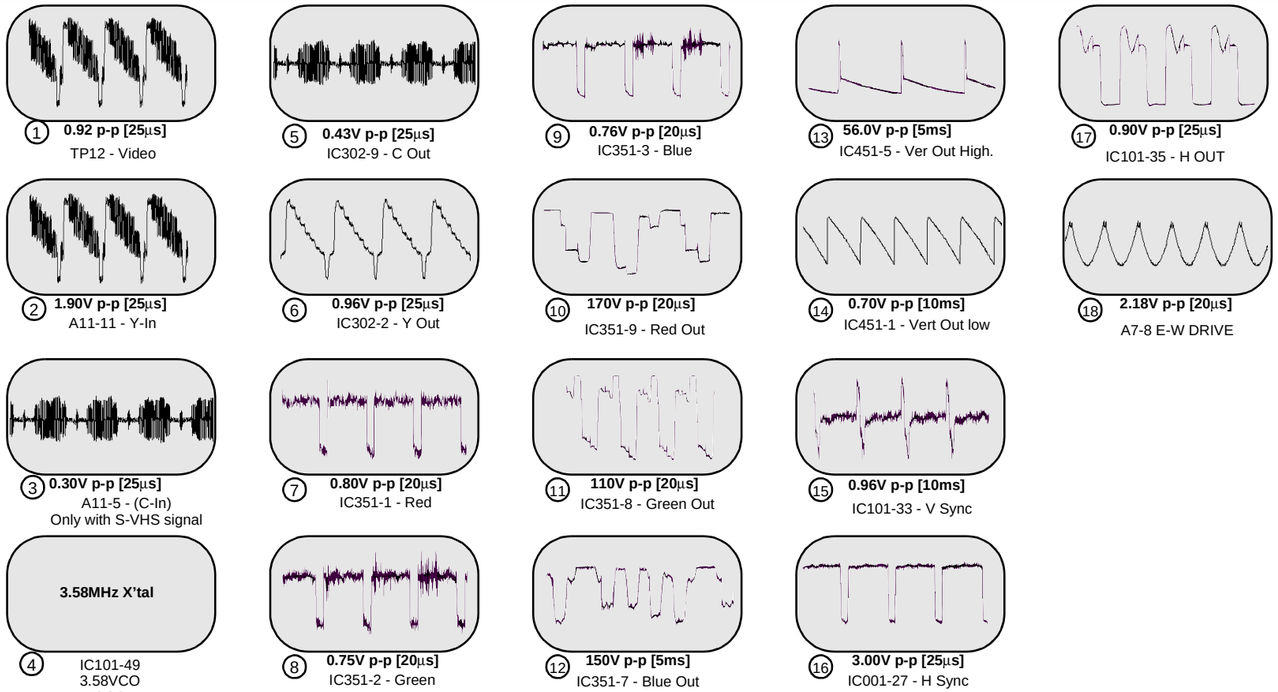


IC2352	
1	5.54
2	5.55
3	5.51
4	GND
5	5.89
6	5.79
7	5.80
8	8.89

IC3001			
1	3.80	33	3.64
2	4.42	34	3.55
3	3.92	35	0.00
4	4.43	36	n.c
5	4.39	37	4.29
6	0.00	38	4.46
7	4.89	39	4.72
8	3.92	40	4.46
9	4.39	41	4.98
10	n.c	42	8.89
11	4.40	43	n.c
12	n.c	44	GND
13	n.c	45	5.45
14	n.c	46	n.c
15	3.93	47	n.c
16	4.39	48	GND
17	3.84	49	n.c
18	4.41	50	4.45
19	4.37	51	n.c
20	0.10	52	n.c
21	4.86	53	n.c
22	n.c	54	n.c
23	4.43	55	n.c
24	3.94	56	n.c
25	4.43	57	GND
26	n.c	58	n.c
27	n.c	59	n.c
28	GND	60	n.c
29	n.c	61	n.c
30	n.c	62	4.43
31	n.c	63	4.61
32	GND.	64	4.43



Waveforms - A-Board



NOTE: Waveforms 7 to 12 are in C-Board.

	Q004	Q005	Q007	Q008	Q009	Q301	Q302
E	3.29	0.32	0.00	0.74	0.74	0.00	0.64
B	0.00	1.19	3.44	0.00	0.00	7.70	0.00
C	3.29	GND	GND	GND	GND	GND	GND

	Q303	Q401	Q451	Q480	Q530	Q531	Q532
E	2.49	0.65	0.71	15.63	11.23	11.91	0.00
B	4.48	5.11	0.00	0.00	11.82	0.00	0.00
C	1.86	GND	GND	15.86	11.89	10.21	0.00

	Q536	Q551	Q601	Q602	Q603	Q701	Q817
E	2.63	0.00	0.00	5.74	1.88	0.62	0.74
B	8.86	-44.88	0.00	8.64	8.89	4.27	0.00
C	1.99	GND	0.68	5.02	1.70	GND	GND

	Q854	Q901	Q902	Q903	Q904	Q905	Q906
E	0.14	1.27	1.27	3.06	6.91	8.54	0.33
B	0.00	GND	GND	6.90	GND	4.35	4.36
C	139.70	1.98	1.96	2.42	7.36	8.84	0.00

	Q907	Q908	Q3101	Q6504	Q6507	Q6508	Q6510
E	0.74	4.2	3.89	3.18	2.64	1.72	1.95
B	0.00	7.22	8.88	4.98	9.98	0.00	GND
C	GND	GND	2.34	2.52	2.00	2.38	2.62

	Q6518	Q6519	Q6520
E	3.93	3.53	1.99
B	4.98	4.98	GND
C	3.26	2.86	2.64

IC 001

1	3.23	22	2.04
2	4.97	23	3.29
3	4.97	24	n.c
4	1.59	25	1.41
5	2.84	26	2.44
6	3.29	27	2.64
7	3.29	28	GND
8	2.85	29	0.00
9	3.29	30	0.11
10	3.29	31	0.11
11	0.20	32	0.11
12	3.29	33	0.00
13	1.65	34	0.00
14	0.42	35	2.54
15	0.00	36	3.74
16	0.00	37	3.40
17	3.15	38	3.60
18	3.06	39	3.29
19	0.92	40	1.59
20	3.29	41	1.59
21	1.47	42	0.00

IC 002

1	GND
2	GND
3	GND
4	GND
5	4.97
6	4.97
7	GND
8	4.98

IC 004

1	4.98
2	GND
3	1.25
4	3.29
5	GND
6	4.98

IC 005

1	9.13
2	4.98
3	GND
4	9.05

IC 006

1	GND
2	GND
3	GND
4	3.29
5	3.29

IC 451

1	1.34
2	15.55
3	-13.79
4	-15.55
5	8.71AC
6	15.61
7	1.34

IC 101

1	4.15	29	3.60
2	GND	30	3.50
3	3.34	31	GND
4	3.33	32	n.c
5	3.32	33	2.74
6	0.00	34	1.10
7	6.00	35	0.48
8	5.27	36	n.c
9	5.16	37	8.89
10	0.00	38	3.00
11	5.91	39	6.21
12	n.c	40	7.44
13	2.62	41	5.90
14	2.46	42	5.00
15	2.50	43	1.00
16	8.76	44	0.00
17	5.09	45	1.82
18	4.92	46	1.44
19	4.878	47	n.c
20	2.54	48	n.c
21	3.07	49	3.97
22	4.27	50	3.40
23	0.64	51	5.02
24	0.66	52	3.07
25	5.11	53	3.10
26	2.05	54	3.75
27	4.30	55	2.49
28	5.07	56	n.c

IC 302

1	1.39
2	2.63
3	2.63
4	2.64
5	7.69
6	7.69
7	GND
8	2.38
9	2.38
10	2.38
11	2.01
12	0.00
13	0.00
14	8.88

IC 740

1	0.00
2	3.96
3	1.83
4	GND
5	0.87
6	1.83
7	0.00
8	8.88

IC 801

1	1.34
2	0.10
3	4.30AC
4	16.25
5	0.00

IC 802

1	0.13
2	10.09
3	GND

IC 821

1	13.13
2	11.92
3	GND
4	1.90

IC 882

1	11.92
2	GND
3	4.99

IC 891

1	13.13
2	8.91
3	GND
4	1.90

IC 6502

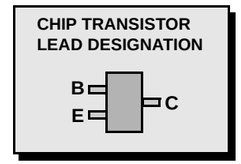
1	8.88
2	GND
3	4.98

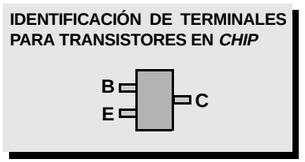
IC 811

1	11.15
2	10.14
3	1.24
4	14.92

IC 6501

1	1.47	15	4.85
2	GND	16	4.85
3	4.91	17	4.85
4	3.44	18	0.00
5	2.07	19	0.00
6	1.42	20	4.90
7	3.20	21	0.00
8	0.00	22	3.49
9	2.44	23	3.93
10	1.71	24	1.68
11	2.19	25	3.54
12	4.97	26	3.94
13	0.00	27	4.94
14	0.00	28	0.00





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